KGBV Jalmana Session 3
Teachers’ Session

Objectives

- Understanding and challenging their preexisting notion of science and science labs
- Planning the next session of Janmanch with them.
- Having Fun

Materials

- 8 paper cups
- 4 threads (नाडा, सूत, घाम)
- Xerox of the story “what is science”
- Fun science (pages 40, 35 and 36)
- Soap solution
- Scissors
- Straws
- 15 cm long broom sticks
- Rubber bands
- Paper strips (30cmx3cm)

STEPS

1. Introduction
2. Notions of Science
3. What is Science
4. Is Science Limited to Subject “Science”
5. Inquiry
6. Conclusion
7. Planning of Janmanch
1. Welcome everyone to the session. Have a short introduction of everyone present in the session.

2. State the objectives of today’s session with the teachers.

3. Briefly recap the proceedings of the last session of Janmanch.

4. Emphasize on the conclusion of the last Janmanch, which was “establishing a science lab as decided by all”.
1. Start with a small activity.
   a. Cups and thread experiment - Making phones using thread and cups. Ask the teachers to make a communicating device using 2 glasses of paper cup and a thread. Make sure that each participant gets to do it with a pair. Here is the link for the reference: https://www.youtube.com/watch?v=M07JRzkgaR8
   b. Once they have done the activity, ask the participants to reflect and analyze the activity in itself.

2. Questions on the activity:
   a. What was your observation?
   b. What maybe the reason behind this particular observation? How much time and energy would go into this activity on a normal working day?
   c. Does this need any special equipment or rather things that are easily accessible could work as replacements?

3. Let the teachers make their own conclusions of the activity and what they explored.

4. If they ask for certain clarification, give them a direction but don’t tell them the answer.
5. This will act as a source to spark the method of inquiry among them. Also leave them with variations of inquiry like:
   a. If the thread between the cups is loose, would the sound still carry?
   b. If the material is changed what would happen? Will all materials lead to similar response or there will be variations?

6. Summarize by stating a brief description of the activity that exhibits how we just did this small activity, involving hands on work, observations and analysis. Ask the teachers if it seems like we did something “scientific” after a response, mention which leads us to our next discussion on “What do we mean by science”.

7. Take a few responses from the teachers and just note them down for further discussion later.
1. Once the responses have been taken, tell the teachers that before going through the session, let’s read an interesting story, “Vigyan Kya hai”.

2. Using the story by Vinod Raina on “Vigyan Kya hai”, to have a discussion around the understanding of “Science”.

3. Once they have read the story, discuss with them on the following prompts -
   a. What was this story about?
   b. The story explores the key pointers that define “science”. Please share your analysis of the story: what are those key pointers?
   c. Let’s try making a link between the story of “elephant” and the scientific “process”.

4. Ask them to write their own definition of science.

5. Once the discussion is done with the teachers, tell the teachers about the origin of the word “Science”, which is derived from “cientia”, a Latin word which means “to know”. In the process of quenching our thirst “to know”, we observe, experiment and analyze to make sense of the world around us closely. Example, can be taken as walking, writing etc.
1. Facilitator will have 4 activities for each subject - language, science, social science and maths.

2. Each activity would be completed with the help of respective subject teacher.

3. The teacher would be given responsibility, to facilitate the same activity in the next session of Janmanch.

Activities:

a. Language -
A hypothesis says that children learn to read and write best when they are given the freedom to express themselves in their local language without a lot of corrections at the initial stages. Storytelling using props gives them access to rich vocabulary. What could be a small experiment that you can do to validate this hypothesis? (Please don’t focus on the rigor of design yet, just focus on how the teacher is able to use the 3 key components of Scientific inquiry in her experiment design). While she is done with it, give her instructions to make a “crab” using A4 paper, this can actually be used as a prop for story telling/role plays. The purpose is to give her a glimpse of how TLMs can be used for language learning (विज्ञान मजा (पृष्ठ – ४०)).
b. Maths -
As a teacher, sometimes our students struggle to understand and visualize the 3D figures. To make them understand these figures, one can actually experiment with stick figures to get them introduced to these concepts. Let's try making 3D models using broom sticks and threads to help children understand these models.

- Ask the teachers, what could be the questions of inquiry and observations using the models (विज्ञान मजा (पृष्ठ – 36)).

c. Social Science -
As a Social Science teacher, we face difficulty in making children understand the sense of direction. So, you decide to make a 2d map of your school and introduce the concept of identifying the direction using the magnet. So, you decide to make a 2d scaled map of the school. What could be the steps to come up with a similar map. Try writing down the steps and draw a rough map using a scale and pencil.
d. Science -
Children love making bubbles. As a science teacher, you intend to use this experiment to make bubbles using soapy solution. But that’s one aspect of it. Kids want to explore how big bubble they can make using different variations. The bigger the bubble, the happier they are. This is a small experiment to explore a way to make the bubble bigger. Now as a science teacher, you can experiment with the relationship between surface area as size of bubble (विज्ञान माजा (पृष्ठ – 35)).

4. Facilitator would ask a few questions to each teacher:
a. What was your observation?
b. What did you learn?
c. What were the basic principles that you used in all the activities?

5. Facilitator : We worked on 4 different subject areas, which had common threads of observation, analysis and application. These 3 themes defines science, as we discussed above. So, science is not just limited to conventional science syllabus, it is around us everywhere, and it is part of every “subject” that we teach.
Listen to the answer patiently. The answers would help in understanding their perception of a science lab. Give everyone a chance to speak, so that not just science teacher, other subject teachers get involved in the discussion.

How subjects (science, maths, social science - history, geography, civics) are being taught?
1. Answer will reflect the current methodology, teachers are using to teach topics. The discussion would also open up all the participants since it is a small group.

2. Do teachers use experiments to explain concepts if some teachers have already mentioned about experiential learning in previous answer, then you can ask other subject teachers if they use activities in their teaching?

3. Observe which subjects are being taught through activities/experiments.

4. If some subjects are not being taught through activities/experiments [which the facilitator would find out from the answer of the previous question], then discussion can go towards “can we teach subjects (other than science) through activities?”

5. Geography: A field visit of children can be organised to explain the concepts of climate conditions, local cropping patterns, soil found in the area, vegetations of the area etc. Map of school campus can be made by Children.
6. Maths: Children can build models of square, rectangle, circle. The calculations of area, perimeter, etc can be done. Calculation of area of school campus. This would help kids understand and feel various shapes and concept of area.

Can we connect topics of science to other subjects? Can Science lab be used to teach other subjects?
1. The discussion should emphasize on “intersectionality” of science with other subjects. Ask any teacher who is not teaching science: How does she/he feel about this?

2. Take subjects like languages, geography, maths, art - music, painting, etc.

3. Language subjects: learning a language involves recognising patterns and understanding the meaning of these patterns. Specific areas in our brain gets activated when we speak. Topics of sound in science “related to pitch” can help us understand how different letters are actually being uttered.

4. Music: Pitch variation can be explained through variation in frequency of sound source. Doppler effect. Various instruments are being designed like speakers, microphones etc using concepts related to sound.

5. Geography: We can know direction using a Magnet. After knowing direction, we can build maps. Seasons can be explained through Sun-Earth Model.
6. Mathematics: In building models/experiments for science, mathematics would be required. Children gain knowledge of various math-concepts while doing experiments. For example, building a clock using sun rays, could help children understand numbers, time concept, circle shape etc.

7. Painting: We like things which are symmetrical (mainly). Some colors are more pleasing to eyes than other colors. How do we see color? Experiments related to properties of light are closely related to subjects like painting.
Conclude the discussion by summarizing viewpoints.

1. So, what we have understood from this discussion is that we can teach topics holistically. We can teach concepts from all subjects through activities and experiments.

2. Science lab is not about doing experiments of science or looking at science activities in isolation, rather it is to build scientific temper to question, experiment and analyse. And all the subjects play some role or the other in doing so.

3. Coming Back to our first question. “What should be there in a Science Lab?”

4. The question would help the facilitator in knowing, if the participants change their answer after the above discussion. Facilitator can add in the answer like outdoor models, materials required for activity related to any subject, can be added in the lab. “What purpose this lab would fulfill? Can we really learn science?”
5. Discussion around this question would help in reflecting on broader aspect “What is science?”.

- The lab will encourage students and teachers to create an environment of learning by doing, experimenting, observing, analysing and reaching their own conclusions - which is the essence of science.
- Science is observing and analyzing phenomenon around us closely.
- Science opens in front of us when we ask questions like How? Why?
- This would build reasoning capacity and problem solving ability among students-teacher community.
- At a later stage, the community can see if this knowledge can be used to solve their local issues for example building a water harvesting system for the school etc.
1. Now once a preliminary understanding is developed on what’s the basic rationale of establishing a science lab and the fact that it is not limited to just number work, let’s discuss what can we actually do in next Janmanch with the children. Sticking with the format adopted in the previous Janmanch, we will continue working on the same. So, we have the next few days to plan for next Janmanch, how can we go about it? Asking what the objectives of Janmanch could be? The facilitator should ensure that the objectives are clear, crisp and not more than 3 in number. (The objectives can be - Coming up with a clear cut plan for establishing Science Lab, building an understanding through some experiments how their lab can look like, having fun).

2. Once an agreement on the objectives is reached, discuss what could be the possible ways to fulfill these objectives? What activities could be done in the session for achieving the same? For example, doing an exploratory activity to build a map of proposed activity lab, coming up with inventory to build this lab, coming up with a deadline to build it and set of actions required to do so, what could be the possible ways to start building our lab- set of experiments, books required? What preparations will be required to achieve these following objectives? What could be the possible work division to ensure that the work gets fulfilled?

3. End the session with a tentative plan for the next session- At least the objectives, the basic outcomes attempted and the materials required for it.