

**Report of
Homi Bhabha Centre for Science Education, TIFR, Mumbai &
Zonal Institute of Education and Training, KV
Collaborative Science Workshop on Enhancing Pedagogical Skills**

CESME, HBCSE

Date: September 16-20, 2019 at HBCSE, Mumbai



**Homi Bhabha Centre for Science Education
Tata Institute of Fundamental Research
September 2019**

I] Introduction

This workshop was organized for middle school Science & Mathematics teachers of Kendriya Vidyalaya as part of CESME (HBCSE) activities for the year 2019. 42 teachers from 40 different Kendriya Vidyalayas attended the workshop at HBCSE.

- **Objective & rationale:**

This workshop aimed to equip the teachers with information about the variety of ways in which students learn so that they are prepared to help each student improve and meet their potential.

It also focused on the development of skills & knowledge that teachers need to address students' learning challenges in science & mathematics.

- **Expected Impact:**

It was expected that, through this workshop, teachers will learn how to make students easily understand different concepts in science, through activities & experiments. They will also get to learn more about basic concepts in mathematics & will come up with some solutions for the difficulties they face while teaching mathematics & science in school.

- **Target Group:**

Middle school Science teachers of Kendriya Vidyalaya schools

II] Methodology

The workshop focused on the NCERT science syllabus of grade 6 to 8th. The participant teachers were divided into two groups. One group attended science sessions and another group had attended mathematics sessions.

In the introduction session of the workshop, teacher participants were encouraged to share

- a. their expectations from the workshop,
- b. science topics that the students find difficult and
- c. challenges faced by the teachers.

Their responses for these three points are summarized below

a. Teachers' expectations from the workshop

The teacher participants mentioned that they expect the workshop to include activities for various science topics especially in the chemistry experimental domain. They were also looking forward to learning strategies for -

- i) connecting daily life experiences with science concepts,
- ii) minimizing the gap between theoretical & practical knowledge and
- ii) increasing students' participation in the teaching-learning process.

b. Students' difficulties in science

Students' difficulty in understanding various concepts in physics was one of the predominant responses provided by the teachers. Chemical reactions & equations were also mentioned as topics that students' find difficult.

c. Teachers' difficulties

Interactions with teachers indicated that the challenges faced by them, in their schools, were primarily related to

- time management (Less time, vast syllabus),
- class control (due to big class strength),
- language barriers (some students are unable to read, write, understand and express themselves in English),
- influence of coaching classes on the students and
- unavailability of adequate time to interact with students.

After understanding teachers' requirement in the introductory session, all resource persons were informed to conduct their sessions according to the teachers need & suggested to focus on those topics which participant teachers demanded.

Different strategies like hands-on science/learn by doing, POE approach, PCK approach like inquiry-based, reflective, collaborative etc., Constructivist teaching strategies and research reading sessions were used to achieve the objectives of the workshop. Also, a glimpse of the nature of science was included in the workshop, as it is crucial for effective science teaching-learning process and responsible participation in society.

III] Feedback of the workshop:

From day 2 to day 5 of the workshop, before the first session, 30 minutes were allotted to gather oral feedback from the teacher participants about

- the usefulness of each session conducted on the previous day,
- their key takeaways and
- suggestions to improve the sessions.

It was decided that post workshop feedback about students' common misconceptions and other difficulties will be collected during the follow-up workshop, scheduled for January 2020.

In addition, digitalized feedback was collected from the participants through day-wise Google feedback forms. These forms were primarily questionnaires seeking their comments about the content, clarity, relevance of the sessions and suggestions for improvement.

The feedback received from the teacher participants through these Google forms are as follows:

• **Feedback of activities/demonstration sessions**

Hands-on Microscope

- a) Learned to handle the microscope
- b) Became confident about using microscopes. Can use microscopes more often for teaching.

Activities in Life Sciences

- a) Learned 'Roleplay' as a teaching tool to teach life processes
- b) Time-consuming

My Food, My choice

- a) Learned food preservation techniques, causes of food spoilage
- b) The session gave an idea of using worksheet to make the topic clearer.

Toys as a context for learning science

- a) Learned how toys can be used as a simple & basic teaching tool
- b) Got an idea of open source lab instruments

Learning Motion

- a) Made the laws of motion more clear through experiments.
- b) Given the new strategy to teach motion.
- c) Requirements of the participants were different from the topics covered in the session.
- d) The activity shown in the session was a little cumbersome.

Feedback of Activities & Demonstration Sessions

Understanding Electricity & Magnetism

- a) The session was enriched with a variety of tools & activities which can be easily carried out in classroom teaching.
- b) But the session duration was not sufficient to understand different concepts in depth.

Understanding chemical science through activities

- a) The activities can make classroom learning interesting.
- b) Students will learn by doing
- c) Learned properties & importance of ash

Understanding our soil

- a) Learned experimental analysis of soil
- b) After session, we can correlate various aspects of science with soil

Activities in Chemistry

- a) Learned practical aspects to teach theoretical part in chemistry.

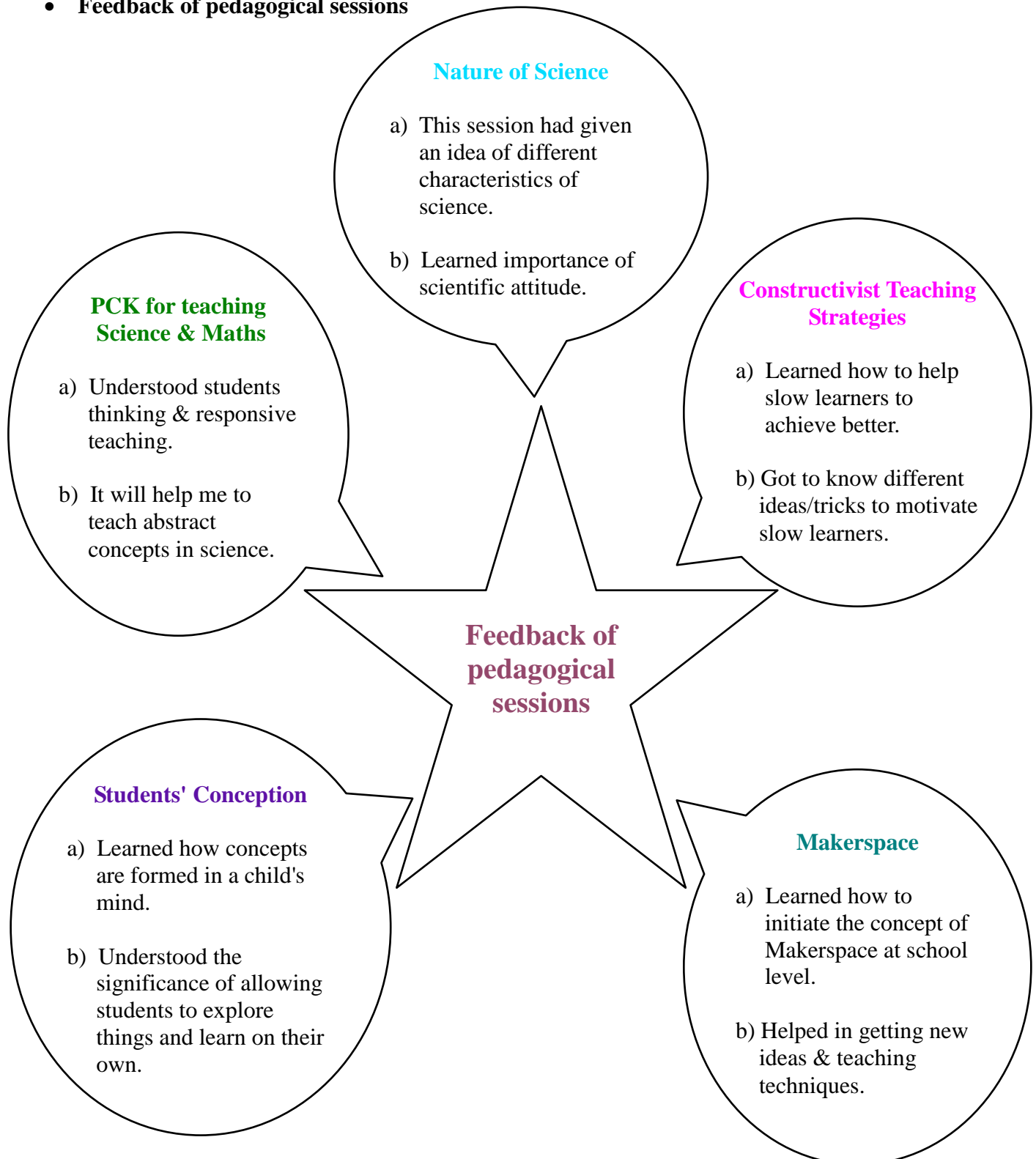
Learning Light

- a) Learned to make pinhole camera & different properties of light.
- b) The activity conducted in the session was helpful and will create curiosity among students.

- **Feedback of Research Reading session**

From 'Research reading' session we learned the way of presenting research papers, what kind of research is going on in the education field. The session was very helpful and gave different ideas of teaching.

- **Feedback of pedagogical sessions**



IV] Notes on the conduct of the workshop

- 1) At the beginning of the workshop, the participants did not seem to be very enthusiastic about attending the sessions. They were worried that attending TPD workshops frequently might adversely affect syllabus completion in their schools especially when students' exams are near.
- 2) Some of the teacher participants wanted to have lighter sessions towards the end of the day.
- 3) A few teacher participants did not perceive the research reading sessions as useful.
- 4) Some teachers mentioned that activities demonstrated/conducted in the session should be feasible in their classrooms since it is difficult to shift the students from their classrooms to the laboratory for each activity.
- 5) From the interactions with participants during feedback sessions, HBCSE resource persons realized that teachers wanted more activities in Physics. This was because the majority of them had Chemistry, Botany or Zoology backgrounds, but in schools, they were expected to teach topics from Physics also.

V] Follow-up action Plan

Follow up Workshop will be conducted with Kendriya Vidyalaya TGT Science Teachers teaching grade 6 to 10.

Tentative Date: 20.01.2020 to 24.01.2020

The teacher participants are connected to each other and HBCSE resource persons through a WhatsApp group where they are encouraged to post images and videos of the activities conducted by them in their schools.

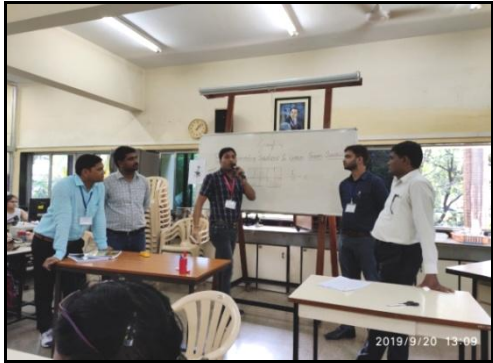


**Students doing chemistry activities in the School
(Image sent through WhatsApp)**

Learning through activities



Sessions conducted during the workshop



Annexure A: List of teacher participants

Number of science teachers = 22, Number of mathematics teachers = 20

Total no. of participants = 42

Sr. No.	Name of the participant	Gender	Designation	Institution
1	Kavita Deodhar	F	TGT Maths	K. V. Air Force Station, Thane
2	Roopa Pandey	F	TGT Science	K. V. 1, Colaba
3	Chandu Chamyal	M	TGT Science	K. V. Air Force Station, Thane
4	Anamika Chauhan	F	TGT Science	KV IFFCO Gandhidham
5	Sonam Kumari	F	TGT Maths	KV Sasaram karup dist Rohtas
6	Ashok Kumar Kushwaha	M	TGT Science	Kendriya vidyalaya Banka, Bihar
7	Khalil Ahmed	M	TGT Maths	Kendriya Vidyalaya no. 3 Colaba.
8	Pavan Kumar Meena	M	TGT Science	Kendriya vidyalaya no 1 kota
9	Nagendra Singh	M	TGT Science	Kendriya vidyalaya , Bundi
10	Dhanraj Meena	M	TGT Science	Kendriya Vidyalaya No.2,Army,Bhuj
11	Rajendra Kumar Meena	M	TGT Science	Kendriya Vidyalaya AFS, Wadsar
12	Darshan Hans	M	TGT Maths	Kendriya Vidyalaya, CRW Harnaut, Nalanda, Bihar
13	Chandreshwar Kumar	M	TGT Maths	Kendriya Vidyalaya, Jhajha
14	Jeayenisha Nirmal	F	TGT Science	Kendriya Vidyalaya, Dwarka, Gujrat
15	Punam Singh	F	TGT Science	Kendriya vidyalaya No 1, Gaya, Bihar
16	Sangeeta Jaiswal	F	TGT Maths	Kendriya Vidyalaya, Koliwada, Mumbai
17	Gulshan Jahan	F	TGT Science	Kendriya Vidyalaya, Koliwada, Mumbai
18	Devendra Singh	M	TGT Maths	Kendriya Vidyalaya, Deogarh, Mumbai
19	Ira Kumari	F	TGT Science	Kendriya Vidyalaya, Danapur, Patna
20	Manoj Kumar	M	TGT Maths	Kendriya Vidyalaya No.2, Jaipur
21	Amit Roy	M	TGT Maths	Kendriya Vidyalaya, Tonk, Jaipur
22	Devraj Meena	M	TGT Science	Kendriya Vidyalaya, Dausa, Rajasthan
23	Dhananjay Pandey	M	TGT Science	Kendriya Vidyalaya, Aurangabad
24	Jay Prakash Singh	M	TGT Maths	Kendriya Vidyalaya, CRPF, Patna, Bihar
25	Tejpal Singh	M	TGT Maths	Kendriya Vidyalaya No.1, AFS, Bhuj
26	Akansha Jain	F	TGT Maths	Kendriya Vidyalaya No.2, Colaba
27	Abhishek Sanwariya	M	TGT Science	Kendriya Vidyalaya No. 1, Jaipur

Sr. No.	Name of the participant	Gender	Designation	Institution
28	Lakhan Singh Meena	M	TGT Science	Kendriya Vidyalaya, AFS, Naliya, Gujrat
29	Jitendra Dwivedi	M	TGT Maths	Kendriya Vidyalaya ONGC Mehsana,
30	Devendra Kashyap	M	TGT Maths	Kendriya Vidyalaya, IFFCO, Gandhidham
31	Manju Tandon	F	TGT Science	Kendriya Vidyalaya, AFS, Baroda
32	Janardan Kumar Rai	M	TGT Maths	Kendriya Vidyalaya, Sonpur, Bihar
33	Ghanshyam Pandit	M	TGT Maths	Kendriya Vidyalaya No. 2, Gujarat
34	Subhranka Sekhar Swain	F	TGT Science	Kendriya Vidyalaya, NPGC, Nabinagar
35	Shailendra Kumar	M	TGT Maths	Kendriya Vidyalaya, Bihar
36	Ashish Kumar	M	TGT Maths	Kendriya Vidyalaya, Viramgam Ahmedabad
37	Ashok Kumar Verma	M	TGT Science	Kendriya Vidyalaya, Itarana,
38	Govind Pandey	M	TGT Maths	Kendriya Vidyalaya, Junagadh, Gujrat
39	Rajkishor Tailor	M	TGT Maths	Kendriya Vidyalaya No.2, Ajmer
40	Snigdha Sen	F	TGT Science	Kendriya Vidyalaya no 2 AFS Pune-32 Lohegaon
41	Machindra Gaikwad	M	TGT Science	Kendriya Vidyalaya BEG, Yerwada, Pune
42	B. B. Sahani	M	TGT Science	Kendriya Vidyalaya, Lakhisarai

Annexure B: List of resource persons at the science workshop

Sr. No.	Resource Persons (HBCSE)	Resource Persons (non-HBCSE)
1	Ankush Gupta	N.R.Murli
2	Arjun Ranbir Singh	
3	Chaitanya Ursekar	
4	Ishan Santra	
5	K. Subramaniam	
6	Kalpana Kharade	
7	Karun Hambir	
8	Mashood K.K	
9	Mayuri Pawar	
10	Narendra D. Deshmukh	
11	Prakash Navale	
12	Prithu Raj Ghosh	
13	Ravi Sinha	
14	Rohini Karandikar	
15	Sandhya Thakur	
16	Santanu Dutta	
17	Sugra Chunawala	
18	Sujatha Varadarajan	
19	Swapna Narvekar	
20	Trupti Bameta	
21	Vijay Lale	
22	Vinod Sonawane	

Annexure C: Schedule of the science workshop

Time	08:00am – 09:00am	09:00am – 09:30am	9:30am – 11:15am	11:15am – 11:30am	11:30am – 01:30pm	1:30pm – 2:30pm	2:30pm – 4:00pm	4:00pm – 4:15pm	04:15pm – 05:45pm	05:45pm – 06:30pm
Day 1 16/09/2019	Breakfast [Main Building Canteen]	[08:30 – 09:30] Registration [In G2] PRO Cell	Introduction Prof. K.Subramaniam & Mr. N, R. Murli [ZIET]	Tea-Break [Outside G1]	Nature of Science Sugra Chunawala	Lunch [NIUS Building Canteen]	Hands-on Microscope Karun Hambir, Narendra Deshmukh	Tea-Break [Outside G1]	Distribution of Research Readings in Groups (6 groups) Sandhya Thakur, Narendra Deshmukh	Tea- Snack Break [Outside G1]
Day 2 17/09/2019	Breakfast [Main Building Canteen]	Feedback	PCK for Teaching Science and Mathematics K. Subramaniam	Tea-Break [Outside G1]	Makerspace as a learning environment Ravi Sinha	Lunch [NIUS Building Canteen]	Activities in Chemistry Vijay Lale	Tea-Break [Outside G1]	Learning Motion Vinod Sonawane, Mayuri Pawar	Tea- Snack Break [Outside G1]
Day 3 18/09/2019	Breakfast [Main Building Canteen]	Feedback	Students Conceptions Narendra Deshmukh	Tea-Break [Outside G1]	Toys as a context for learning science Ravi Sinha	Lunch [NIUS Building Canteen]	Activities in Life Sciences Sandhya Thakur, Narendra Deshmukh	Tea-Break [Outside G1]	Constructivist Teaching Strategies Kalpana Kharade	Tea- Snack Break [Outside G1]
Day 4 19/09/2019	Breakfast [Main Building Canteen]	Feedback	Learning Light Mashood K. K., Trupti Bameta	Tea-Break [Outside G1]	Understanding Electricity & Magnetism Vinod Sonawane, Mayuri Pawar, Karun Hambir	Lunch [NIUS Building Canteen]	My Food, My choice Rohini Karandikar, Sandhya Thakur	Tea-Break [Outside G1]	Understanding Chemical Sciences through activities Swapna Narvekar, Prakash Navale	Tea- Snack Break [Outside G1]
Day 5 20/09/2019	Breakfast [Main Building Canteen]	Feedback	Understanding Our Soil Ankush Gupta	Tea-Break [Outside G1]	Research Reading Presentations	Lunch [NIUS Building Canteen]	Group photo & Future Directions + Follow-up	Tea-Break [Outside G1]		