

HOMI BHABHA CENTRE FOR SCIENCE EDUCATION (TIFR)

Teacher Professional Development Program

For DSCERT, Karnataka

Date: 22nd to 26th June 2105

Introduction:

Organizing Teacher Professional Development Workshop (TPD) is one of the prime objectives of Homi Bhabha Centre. Training is carried for improvement in quality teaching. DSCERT, Karnataka requested HBCSE to conduct five days TPD Programme for physics teachers. This workshop was organized to cater the needs of aspiring physics – Mathematics teachers deputed from DSCERT, Karnataka. The teachers are in their teaching profession since they joined the school but all the teachers do not have physics or electronics as a core subject's specialization at the graduate or postgraduate level. Sudden change in curriculum makes teaching difficult so the department found that teachers are facing problem in delivering the content from the text book. The need arises due to incorporation of new syllabus and new text books. Recently because of revised text book in physics teachers felt that they need to get more information and subject knowledge in electronics as topics like semiconductor devices like diode and transistors are introduced at 10th standard. Fundamental of physics is difficult to understand without practical knowledge, so teachers expected some application of semiconductor devices and their working.

Objectives of the workshop:

Keeping the need and requirement of teachers in mind we developed various experimental set ups and electrical gadgets. Initially we explained them few experiments in 'general science', 'electricity and magnetism' and demonstrated some experiments which are displayed in Integrated Laboratory. Right from first day everybody was taking active participation. Each day, afternoon session was

allotted for preparation of teaching aid. Teachers were expected to cover any concept and prepare a suitable set up and develop the strategy to explain that chosen experiment. The emphasize was given to use any readily available material in the laboratory. Various groups were formed and on the last day opportunity was given to explain and present the work related to development of set up and concepts covered. Laboratory help and other mentorship were provided to all the groups. The prime objective of this workshop was activity based teaching learning. This way we tried to cover various pedagogical aspects in this workshop.

Following are some of the strategies and aspects related to science education which we tried to cover.

- Analysis of text books
- Inquiry Based Learning
- Predict Observe Explain (POE)
- Hands-on Science
- Constructivist approach to Teaching ‘light’
- Misconceptions in Physics
- Young Historians
- Nature of Science
- Research Readings
- Introduction to Teaching Diode & Transistor
- Astronomy

Learning Objectives of the workshop:

In this five day TPD workshop we could learn that teacher needs inputs and guidance based on what they wanted to teach in regular classroom. It is also realized that teacher need to go in deeper understanding. Experiments and demonstrations helps in improving the classroom interactions with the students. Teachers are ready to accept different pedagogical aspects which student can understand. Teachers feel proud in doing with their own hands and also ready to carry different skills and ability to their home school.

Preparation of teaching learning material:

The materials like copper wire, pieces of metal, conducting wires, dry cells, tap keys, electric torch bulbs and bulb sockets, magnets and

measuring instruments like voltmeter, ammeter, and galvanometer are made available to the teachers, facility like cutting, bending, soldering was provided along with the human resource. Teachers perform well and could produce gadgets and some experimental setups. As the diode and transistor circuits are introduced newly with proper guidance and careful handling of this devices, teachers could built successful circuits and demonstrated the functioning of this semiconductor devices. This experience was totally new to them. Teachers are enriched with knowledge about resistance, capacitance value, and transistor characteristics.

Format of the workshop and Resource persons:

On 1st day we circulated a worksheet in which the teachers were expected to write about their problems in teaching in classroom and their need and requirements. During 1st session they were exposing to lecture session and in 2nd half they were given hand on science experience. Firstly the ‘Need Assessment’ worksheet is distributed and data is collected which helped us to make necessary changes in various sessions of workshop.

(Teachers Worksheet for Need Assessment)

Name of Teacher: _____
Class to which you teach physics: _____
Years of teaching experience: _____
Name of school: _____ Rural / Urban
Medium of Instruction: _____
Mother tongue: _____

- 1) What are your expectations from this workshop?
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- 2) Do you feel that a teacher needs to undergo professional development programmes?
Why?
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3) What difficulties do you face during teaching of high school physics?
List the topics.

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4) What are some questions that physics students raise in the classroom?

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5) During teaching in the class how do you ensure students' participation?

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Resource persons involved in the five day TPD programme:

- Jayashree Ramadas
- Pradhan H.C
- ArvindKumar
- Sugra Chunawala
- Karen Haydock
- N.D. Deshmukh
- V.C Sonawane
- Meena Kharatmal
- Disha Gupta
- K.T, Hambir
- Susneha Ayare
- Varsha Pawar
- R. Shaikh
- Aabha Vaishyanpayan

Schedule of the workshop: (TIME TABLE)

Day/ Time	Monday, June 22, 2015	Tuesday, June 23, 2015	Wednesday, June 24, 2015	Thursday, June 25, 2015	Friday, June 26, 2015
09:00 – 09:30	Registration + Introduction & Inauguration,	Feedback & Discussion	Feedback & Discussion	Feedback & Discussion	Feedback & Discussion
09:30 - 11:00	Need Assessment Resource Persons	Analysis of text books For science processes Meena Kharatmal, Jayashree Ramadas	Inquiry Based Learning: Electromagnetism– POE Sonawane V.C	Electricity Sonawane V.C	Kinematics, Newton's laws, gravitation Arvind Kumar
11:30 - 13:00	Constructivist approach to Teaching 'light' Jayashree Ramadas	Misconceptions In Physics H.C. Pradhan	'Young Historians' Karen Haydock	Nature of Science Sugra Chunawala	Research Readings N.D. Deshmukh
14:00 – 15:30	Laboratory Session - I physics (Electricity & Magnetism) (Sonawane V.C)	Hands-on Science KTH, Susneha, Varsha, R. Shaikh	“Yes you can Do It”! K.T.Hambir, Sonawane V.C	Astronomy Aabha	Introduction to Teaching Diode & Transistor Disha Gupta
17:00 - 17:45	Design and Fabrication of TLM	Design and Fabrication of TLM	Design and Fabrication of TLM	Teachers Presentation	Valedictory and certificate distribution

Predict Observe Explain (POE):

During this workshop we carried experimentation session. In one of the experimentation session (POE) approach is adapted for investigating the experimentation set up it was based on “Faraday’s laws of electromagnetic induction” following is the worksheet used for this theme.

Question –Answer POE approach worksheet

Predict, Observe, Explain (POE)

Title of the Experiment: Faradays demonstration of ‘Electromagnetic Induction;

1. Draw the circuit diagram? Use the schematics.



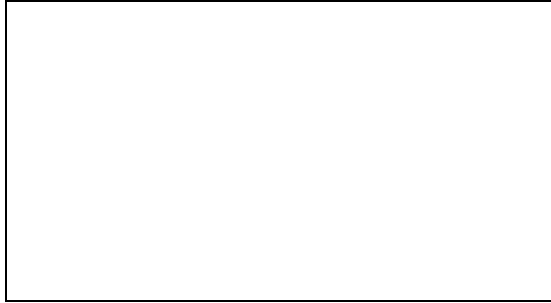
2. What happens when the magnet is moved in the coil? Will the Indicator deflect?

3. What happens when the ‘North Pole’ of the magnet is brought near the coil?

4. What happens when the ‘South Pole’ of the magnet is brought near the coil?

5. Write the formula for emf generated, on what factors the emf is dependent on?

6. Observe the needle deflection in the galvanometer; Represent the current and voltage on X-Y Plot Draw the waveform/diagram?



7. How and why the current flow in the coil? If we put piece of wood instead of magnet, then will you get deflection?

8. What is Lenz's law? What is the importance of this law?

9. What is the name of the meter? Does it measure the current?

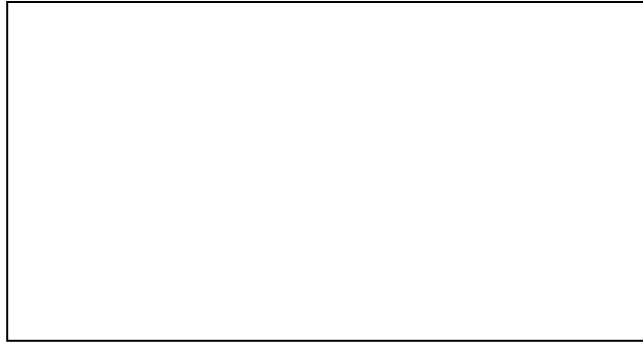
10. Instead of moving magnet in the coil, if coil is moved towards the magnet.....what do you infer?

Preparation of worksheet for Demonstration Activity:

Homi Bhabha Centre for Science Education (DSERT) Karnataka Teachers' Workshop

Worksheet for physics teacher

- 1) Title:
- 2) Watch the demonstration.
 - a) Draw a schematic diagram of the setup.
 - b. Depict the conceptual aspects of this demonstration using diagrams, graphs, arrows, labels, etc.



4) List the concepts that are related to the present experiment/demonstration.

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5) Write any equation/ formula related to the experiment.

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6) List any questions that come to your mind, related to the experiment.

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7) Can you suggest another experiment that involves similar concepts?

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8) Draw the diagram of this alternative experiment.



Feedback & Feedback form:

During the five day workshop besides everyday feedback on every day, the following feedback form is field up which is a written mode of feedback. All this is done on last day.

Teachers feedback at end of the workshop: (Feedback Form)

Topic	feedback	suggestions
Constructivist approach to Teaching 'light' Jayashree Ramadas		
Laboratory Session - I Physics Sonawane V.C		
Analysis of text books For science processes Meena Kharatmal, Jayashree Ramadas		
Misconceptions In Physics H.C. Pradhan		
Hands-on Science KTH, Susneha, Varsha, R. Shaikh		

Inquiry Based Learning: Electromagnetism – POE Sonawane V.C		
'Young Historians' Karen Haydock		
"Yes you can Do It" K.T. Hambir, Sonawane V.		
Electricity Sonawane V.C		
Nature of Science Sugra Chunawala		
Astronomy Aabha Vaishampayan		
Kinematics, Newton's laws, gravitation Arvind Kumar		
Research Readings N.D. Deshmukh		
Introduction to Teaching Diode & Transistor Disha Gupta		
Unifying Concepts in Science P.K. Joshi		
Design and Fabrication Of TLM		

Sonawane V.C. (Programme coordinator)