



केन्द्रीय विद्यालय संगठन  
KENDRIYA VIDYALAYA SANGATHAN

आंचलिक शिक्षा एवं प्रशिक्षण संस्थान, मैसूर  
**ZONAL INSTITUTE OF EDUCATION AND TRAINING,**  
**MYSURU**

विज्ञान में योग्यता आधारित मूल्यांकन: परीक्षण वस्तुओं की रचना

Competency Based Assessment in Science: Design of test Items

(31.07.2024-02.08.2024)



सुश्री मीनाक्षी जैन/Ms Menaxi Jain

निदेशक/Director

आंचलिक शिक्षा एवं प्रशिक्षण संस्थान, मैसूर

**ZONAL INSTITUTE OF EDUCATION AND TRAINING, MYSURU**

**List of Participants for 3-Day online Workshop on  
Competency based assessment in Science: Design of test items**

S No.	Name of the Teacher (Ms/Mr)	Name of the KV	Region
1	PRIYANKA	K V NO.2 KASARAGOD	ERNAKULAM
2	URVASHI SONKAR	K V CRPF PERINGOME	ERNAKULAM
3	Mukesh Kumar Gupta	K V PAYYANUR	ERNAKULAM
4	Subhadra Sankar	K V MALAPPURAM	ERNAKULAM
5	Krishnapriya M	K V OTTAPALAM	ERNAKULAM
6	HARSH RAJ	K V INS DRONACHARYA	ERNAKULAM
7	SAUMYA RAJ	K V NTPC KAYAMKULAM	ERNAKULAM
8	RAJESH KUMAR G C	K V PANGODE	ERNAKULAM
9	GVK Kameswara Rao	No.1 Nausenabaugh	Hyderabad
10	D K Shivani	No.1 Vijayawada	Hyderabad
11	Preethy	No.1 Tirupati (S.1)	Hyderabad
12	Yogesh Tomar	Rajampet	Hyderabad
13	D Subhashini	No.1 AFA Hyderabad	Hyderabad
14	Shweta Sharma	Khammam	Hyderabad
15	Shreya Sharma	NPA Shivarampally	Hyderabad
16	Sumathi Kumar	No.1 Uppal	Hyderabad
17	Ushma Teotia	No.1 Jalahalli	Bengaluru
18	Merlin S. Wilson	No.1 Hubballi	Bengaluru
19	Priya Kanwar	K.R. Puram	Bengaluru
20	Satyavrat Sharma	IISc.	Bengaluru
21	Arati Prasad	NAL	Bengaluru
22	Dipti Pandey	ASC Centre	Bengaluru
23	Ms Priya Chaudhary	AFS Avadi	Chennai
24	Ms.Jyoti Pandey	Tambaram 2	Chennai
25	Mrs.Anjali Yadav	IIT	Chennai
26	Smt.Rajani Nadar	Nagercoil	Chennai
27	Mr. Padam Kumar Meena	Perambalur	Chennai
28	Smt.Seema Srivastava	Madurai 2	Chennai
29	Mrs. Gayathri	Vijaynarayanam	Chennai
30	Mrs.Ankita Yadav	Kalpakkam NO 1	Chennai

## **COURSE DIRECTOR**

**Ms Menaxi Jain**

**Director**

**ZONAL INSTITUTE OF EDUCATION AND TRAINING, MYSURU**

## **ASSOCIATE COURSE DIRECTOR**

**SH MANOJ KUMAR PALIWAL**

**PRINCIPAL**

**PM SHRI KV NO.2 MADURAI**

## **COORDINATOR**

**MR DINESH KUMAR**

**TRAINING ASSOCIATE (PHYSICS)**

## **RESOURCE PERSON**

**MS SEEMA SARASWAT TGT(SCI) KV VIJAYPURA**

**MS NEETA WAGE TGT(SCI) KV HEBBAL**

## **EDITORIAL BOARD**

S No.	Name of the Teacher (Ms/Mr)	Designation	Name of the KV	Region	Class alloted
1	PRIYANKA	TGT (SCIENCE)	K V NO.2 KASARAGOD	ERNAKULAM	X
2	URVASHI SONKAR	TGT (SCIENCE)	K V CRPF PERINGOME	ERNAKULAM	
3	Mukesh Kumar Gupta	TGT (SCIENCE)	K V PAYYANUR	ERNAKULAM	IX
4	Subhadra Sankar	TGT (SCIENCE)	K V MALAPPURAM	ERNAKULAM	
5	Krishnapriya M	TGT (SCIENCE)	K V OTTAPALAM	ERNAKULAM	VIII
6	HARSH RAJ	TGT (SCIENCE)	K V INS DRONACHARYA	ERNAKULAM	
7	SAUMYA RAJ	TGT (SCIENCE)	K V NTPC KAYAMKULAM	ERNAKULAM	VII
8	RAJESH KUMAR G C	TGT (SCIENCE)	K V PANGODE	ERNAKULAM	VI

# KENDRIYA VIDYALAYA SANGATHAN

## ZONAL INSTITUTE OF EDUCATION AND TRAINING MYSURU

Date :11.12.2023-15.12.2023

### TIME TABLE

#### Competency based Assessment in Science: Design of test items

	9.00-9.30 am	9.30am-11.00am	11.00 am-11.15 am	11.15am -12.45 pm	12.45 pm - 1.45 pm	1.45 pm-3.15pm	3.15-3.30pm	3.30-5.30pm
31.07.2024	Assembly & Hands on Activities	Aims and Objectives of Teaching Science (ACD Sir)	Tea Break	Understanding Competency Based Learning for Scientific literacy (Ms Neeta)	Lunch	Principles of Assessment& Assessment Objectives (Ms Seema)	Tea Break	Group Formation & distribution of work *Group Work
01.08.2024	Assembly & Hands on Activities	Design Principles & Writing Test Items (Ms Seema)		Learning Outcomes in Science (Ms Neeta)		Hands on activity (Participants)		Group Work
02.08.2024	Assembly & Hands on Activities	Presentation and Discussion on test items designed by groups		Group Work		Group Work		Closing Session

## Report – Day 1

**Date:** 31st July 2024

**Organised by :** ZIET, MYSORE

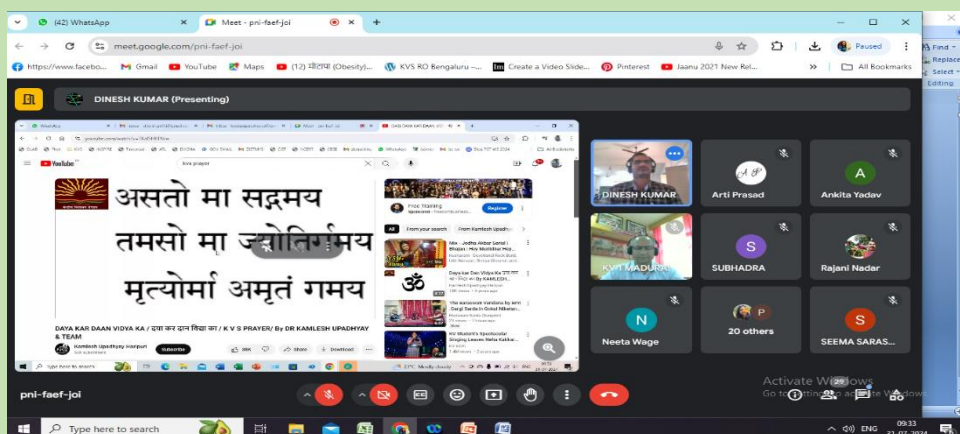
**Facilitators:** Mr. Manoj Paliwal, Mr. Dinesh Kumar, Ms. Seema Saraswat, Ms. Neeta Wage

**Report by:** Ms. Ushma Teotia, TGT Science, Bangalore Region

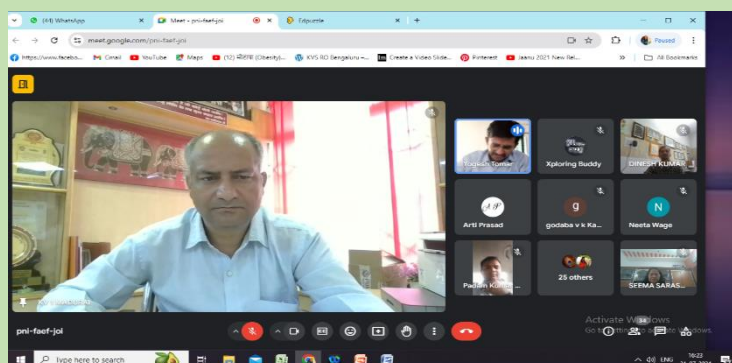
### 1. Introduction and Opening

#### • 9:30 AM – 10:00 AM: Welcome and Introduction

- **Introduction by Mr. Dinesh Kumar:** Mr. Dinesh Kumar opened the workshop with a warm welcome, outlining the objectives and importance of competency-based education.
- **KVS Prayer:** The day began with the KVS (Kendriya Vidyalaya Sangathan) prayer, setting a positive tone for the day's activities.

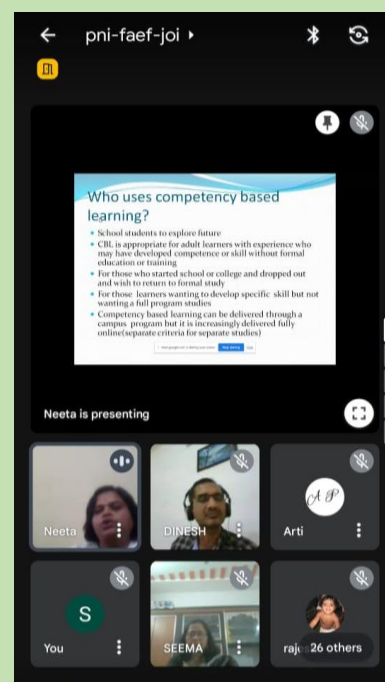
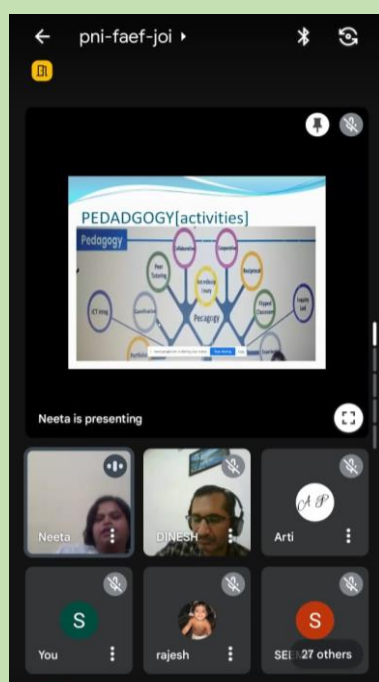
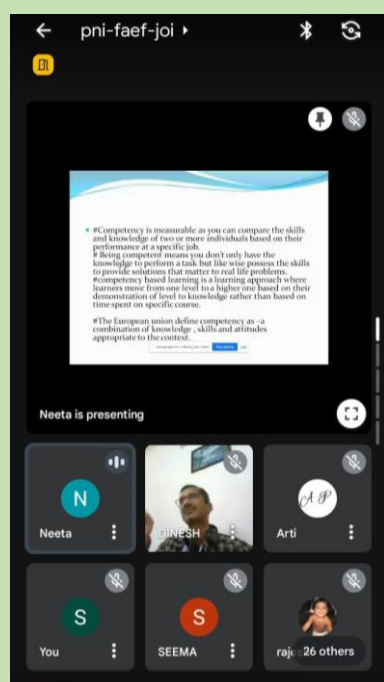


- **Briefing by Mr. Manoj Paliwal:** Mr. Manoj Paliwal, Principal of K.V. Madurai, provided an overview of the workshop's goals and the relevance of competency-based learning in modern education.



## 2. Session 1: Competency-Based Learning for Scientific Literacy

- **Facilitator:** Mrs. Neeta Wage
- **Duration:** 10: 00 AM – 1:00 PM
- **Key Points Covered:**
  - **Measurability of Competencies:** Discussion on whether competencies can be measured and the importance of creating measurable and learner-centric assessments.
  - **Assessment Content:** Emphasis on assessing content that is relevant to the learner's progress and development.
  - **Rubrics:** The necessity of having proper rubrics for evaluating each activity to ensure fairness and clarity.
  - **PISA Overview:** Introduction to the Programme for International Student Assessment (PISA) and its role in international competency-based assessment.
  - **Science Education vs. Scientific Literacy:** Clarification of the distinction between teaching science education and fostering scientific literacy.
  - **Educational Approaches:** Highlights on spiral learning, experiential learning, cooperative learning, and experimentation.
  - **5E Model of Teaching:** Detailed explanation of the 5E model – Explore, Explain, Elaborate, Engage, Evaluate – as a framework for effective teaching.



## 3. Session 2: Hands-On Activity and Demonstrations

- **Facilitator:** Mr. Dinesh Kumar/ Ms. Neeta Wage
- **Duration:** 11:15 AM – 12:30 PM
  - **Activities: Lens and Mirror Activity:** A practical activity using paper and pencils to demonstrate the properties of concave and convex lenses and mirrors. This activity engaged all participants actively.





- **Video Presentations by Ms. Neeta Wage:** Videos showcased experiential learning techniques, classification skills, learning by trial and error, and design creation.
- **Sprinkler System Activity:** Mr. Dinesh Kumar demonstrated an automatic sprinkler system using water bottles, straws, and water. This activity illustrated several physics concepts, including pressure differences and Pascal's Law.



- **Competency-Based Questions:** Development of questions based on the sprinkler system activity, focusing on knowledge, understanding, application, and evaluation.

#### 4. Lunch Break

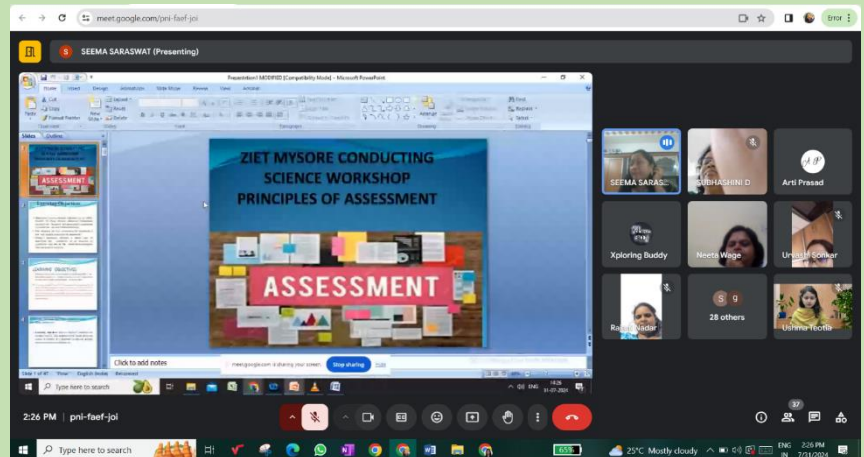
- **1:00 PM – 2:00 PM**

#### 5. Session 3: Assessment Outcomes

- **Facilitator:** Mrs. Seema Saraswat
- **Duration:** 2:00 PM – 3:45 PM
- **Key Points Covered:**

- **Learning Objectives vs. Learning Outcomes:** Differentiation between learning objectives and outcomes, and their significance in the assessment process.
- **Assessment Validity and Reliability:** How to make assessments valid and reliable.
- **Purpose of Assessment:** Discussed the purpose and importance of assessment in competency-based education.

**Video on Experiential Learning:** A video was shown to illustrate the principles of experiential learning which Ms. Seema Saraswat has used in her classes.



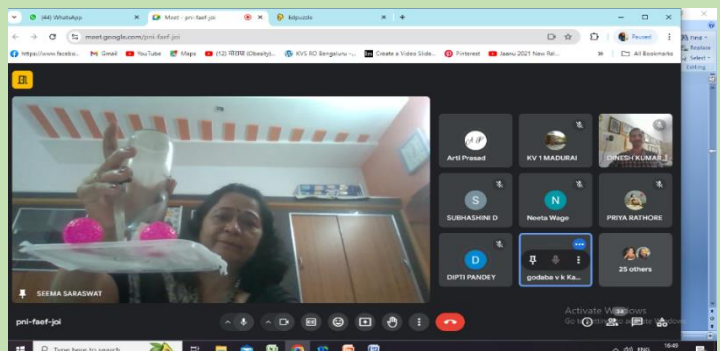
## 6. Session 4: Application of Physics Concepts

- **Facilitator:** Mr. Manoj Paliwal/ Mr. Dinesh Kumar
- **Duration:** 3:45 PM – 5:15 PM
- **Key Points Covered:**

- **Daily Life Examples:** Mr. Manoj Paliwal discussed how everyday examples can be used to teach physics concepts and frame competency-based questions.



- **Activity by Ms. Seema Saraswat:** Demonstration of pressure difference using a bottle and a candle.





- **Question Framing:** Participants framed competency-based questions based on the activities demonstrated and engaged in a thorough discussion of these questions.



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## 7. Conclusion and Feedback

- **5:15 PM – 5:30 PM**

- The day concluded with a recap of the key takeaways and an opportunity for participants to provide feedback.
- The workshop ended with reflections on the activities and their implications for teaching and learning in a competency-based framework.

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**Summary:** Day 1 of the competency-based workshop provided a comprehensive introduction to competency-based learning with a focus on scientific literacy. It included both theoretical insights and practical activities, enabling participants to engage deeply with the concepts. The day's sessions fostered active participation, hands-on learning, and the application of new teaching strategies and assessment techniques.

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**Next Steps:** Participants are encouraged to review the concepts covered, apply the learned strategies in their own contexts, and prepare for Day 2, which will continue to build on the foundation established.

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Thank you for your participation and contributions to the workshop!

**Report by:** Ms. Ushma Teotia  
TGT Science  
Bangalore Region

## REPORT OF DAY 2

Morning assembly: 9:30 a.m to 10:00 a.m.

The day 2 of competency-based assessment training started with morning assembly, meditation and some yoga Suggested by Shri Dinesh sir. We all felt refreshed after the meditation and yoga.

Session: 1

Taken by: Mrs. Seema Saraswat Ma'am

Topic: Design principles and writing test items.

Time: 10:00 a.m. to 11: 15 a.m.

During this session we were shown an activity related to seed germination in which 3 types of seeds were taken and they were allowed to germinate.

This shown us that what kind of conditions are required for seed germination process.

In the same way another test item shown to us was a Rhoeo leaf slide to show stomata. Again, we were given the task of forming test items. we tried to prepare the test items and later on the questions were discussed and we were told about the areas where improvement is needed.

Mam also explained us the steps related to developing test items. Ma'am explained us the difference between the different types of test items like Short answer test items and multiple-choice test items. Why's 4 options are being given in a multiple-choice question was explained very nicely by mam.

The session was very enlightening and learnt about the areas in which mistakes were there and what steps should be taken to improve the test items.

Session: 2

Taken by: Ms. Neeta Wage Topic: Learning outcomes in science.

Lunch break

From 1:15 pm to 2: 15 pm

Session :3

Taken by: Mrs. Seema ma'am and Sh. Dinesh Kumar Sir

Topic: Designing of test items

Time: 2:15 p.m. to 3:45 p.m.

We were assigned 2 chapters from different classes and we tried developing different kinds of test items according to the Distribution of Assessment objectives in different classes.

We were given time to make different type of questions so that they can be discussed later and areas of improvement can be told.

In between Dinesh sir and Seema ma'am also told us to take care of Assessment objectives. They also asked us about if we were facing any kind of problems while designing test items.

Session :4

Taken by: Mrs. Seema ma'am, Sh.Dinesh Kumar, Ms Neeta Waghe Ma'am

Topic: Discussion of different types of questions or test items prepared by us.

Time: 3:45 p.m. to 5: 30 p.m.

In the last session we discussed different types of test questions make by us . Respected resource persons told us about the areas where improvement is needed. They told us that we have to take care about the distribution of marks and the level of students. The language which should be used while framing questions should be understood to the children then only they will be able to express themselves properly.

We got to learn a lot by this session. This session was very interactive and enlightening. We also shared our views with our fellow mates and tried to help each other in designing test items in a better way.

Day 2 concluded with learning a lot of new things related to designing of test items in science. We learnt about the weak points and the methods by which we can improve our test items .

Report Day 3 on the Competency-Based Workshops for Mathematics and Science

Date: 31st July to 2nd August, 2024

Mode of the workshop was ONLINE.

The recent competency-based workshops held for Mathematics and Science were a great success, providing valuable insights and strategies for enhancing assessment methods. The workshops were conducted under the esteemed guidance of Ms. Menaxi Jain, Director of ZIET, Mysore, who graciously provided the opportunity for educators to enrich their assessment strategies. Her support was invaluable, and we extend our heartfelt gratitude to her.

We also thank the Assistant Course Directors, Mr. Siby Sebastian, Principal of K.V. INS Dronacharya, Kochi, for Mathematics, and Mr. Manoj Paliwal, Principal of K.V. 1 Madurai, for Science. Their unwavering guidance throughout the workshop was instrumental in ensuring its success. Their commitment to continuous improvement and support was truly praiseworthy.

The workshops were enriched by the expertise of the resource persons, who provided deep insights and clarified various aspects of assessment in alignment with the latest Education Policy:

Resource Persons for Mathematics:

Mr. M. S. Kumar Swamy, TGT (Maths), K.V. Gachibowli, Hyderabad

Ms. P. S. Kavitha, TGT (Maths), K.V. DRDO, Bengaluru

Resource Persons for Science:

Ms. Seema Saraswat, TGT Science, K.V. Vijayapura

Ms. Neeta Wage, TGT Science, K.V. Hebbal

These experts, through their detailed sessions, expanded our understanding of competency-based assessment and shared best practices. Their contributions were invaluable in enhancing our knowledge and skills.

We would also like to acknowledge the efforts of the Course Coordinators,

Mr. D Sreenivasulu for Mathematics and

Mr. Dinesh Kumar for Science.

Their continuous efforts ensured smooth communication and coordination among all participants, keeping the workshops organized and focused.

Lastly, a special thanks to all the participants who attended the workshops with great enthusiasm and zeal. Their active participation and eagerness to learn were essential in making this event a success. We hope that everyone will be able to implement the knowledge and techniques gained during these three days in their respective Vidyalayas and share these insights with their colleagues.

We also appreciate the technical support that enabled smooth online sessions, including reliable internet connectivity and the capabilities of our devices, which facilitated a seamless learning experience.

In conclusion, the workshops were a resounding success, providing a wealth of knowledge and practical strategies that will undoubtedly benefit our educational practices. We look forward to more such enriching experiences in the future.

Thank you all once again.

Have a great day ahead.

## Sessions taken by Associate Course Director and Resource Persons



CBA\_ ASSESSMENT  
OUTCOMES BY SEEN



LEARNING  
OUTCOMES.pptx



COMPETENCY  
BASED LEARNING.pptx



TEST ITEM  
DEVELOPMENT.pptx

### ACTIVITY 1:-

#### Test Item: Seed Germination Observation

**Objective:** Students will observe and analyze the different stages of seed germination.

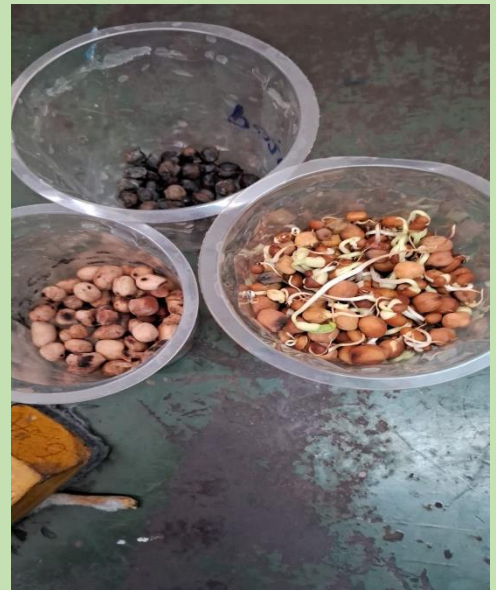
**Questions** Observe the three containers in the image. Describe the differences in the appearance of the seeds in each container.

Q Which condition appears to have the highest rate of seed germination? Provide evidence from the image to support your answer.

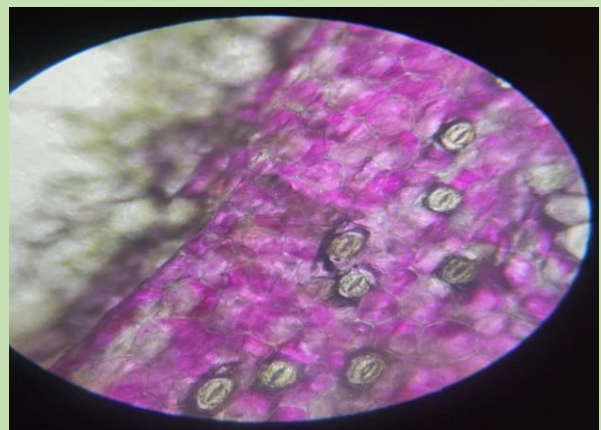
Q How did the roasting process affect the germination of the seeds compared to the normal and boiled seeds?

**Conclusion and Inference:** Based on the image, what can you infer about the importance of seed treatment on germination rates?

**Practical Application:** In agricultural practices, why is it important to understand the effects of different treatments on seed germination?



### ACTIVITY 2:-





## Test Item: Stomata Observation and Analysis

### Instructions:

**Observation:** Look at the provided microscope image of stomata. Note the structures and their arrangement.

**Questions Labeling Activity:** Using the provided image, label the guard cells, stomatal pore, and surrounding epidermal cells.

### Questions:

Identify the stomata in the image. How can you distinguish them from the surrounding cells?

Label the guard cells and the stomatal pore in the image.

Explain the function of the stomatal pore.

What environmental factors can cause the stomata to open or close?

Explain how stomata contribute to plant transpiration and why this process is important for the plant.

How might the structure of stomata differ in plants that live in arid environments versus those in humid environments?

### ACTIVITY 3:-



**Identification:** Identify the key components of photosynthesis shown in the image. What does each student represent?

**Reactants and Products:** Q What are the reactants of photosynthesis as illustrated in the image?

Q What products are formed as a result of photosynthesis?

Q Explain the role of sunlight in the process of photosynthesis.

**Chemical Equation:** Write the balanced chemical equation for photosynthesis using the components shown in the image.

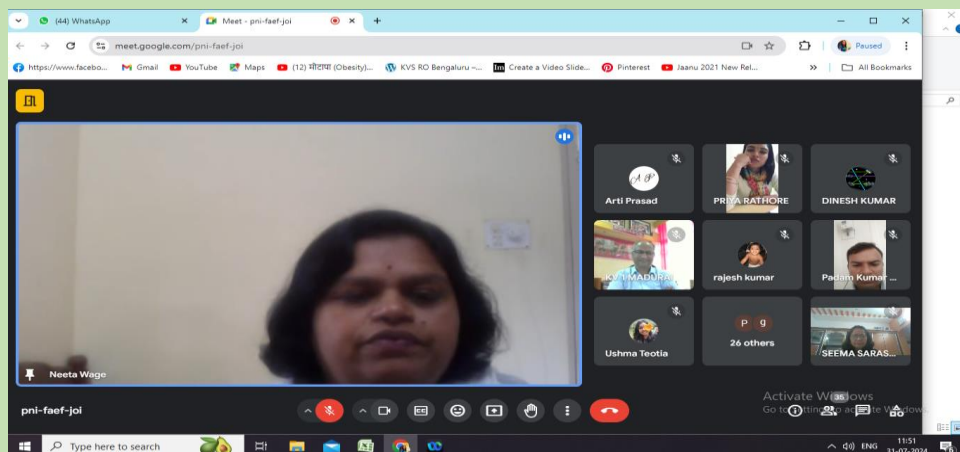
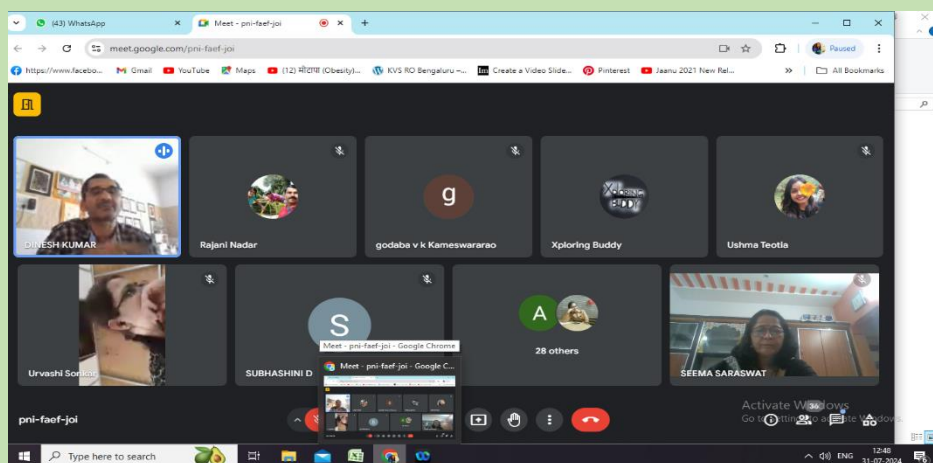
***Seed Germination Image (Multiple-Choice Question):***

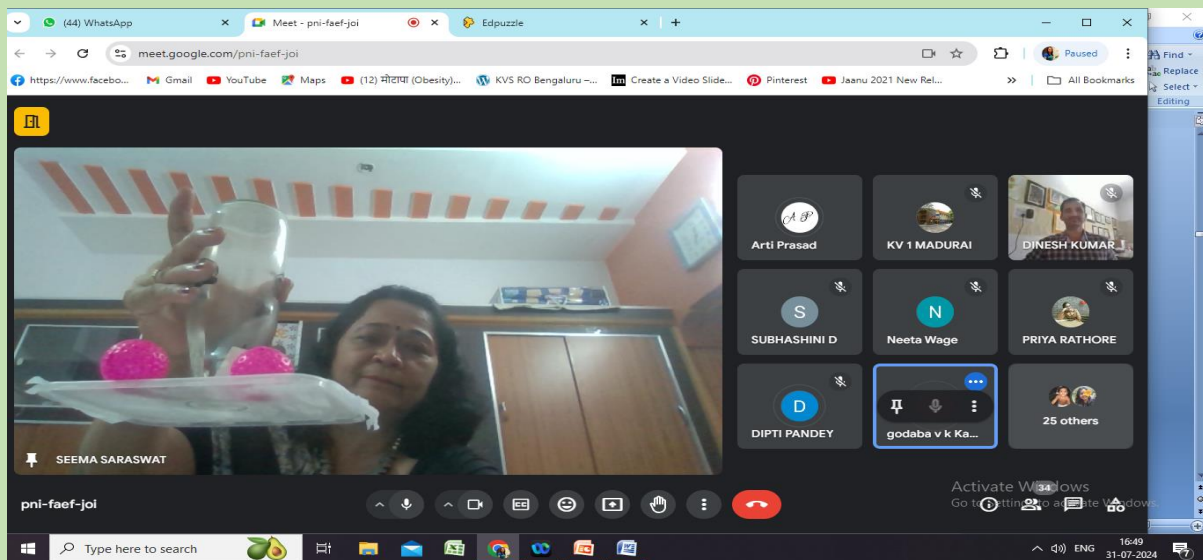
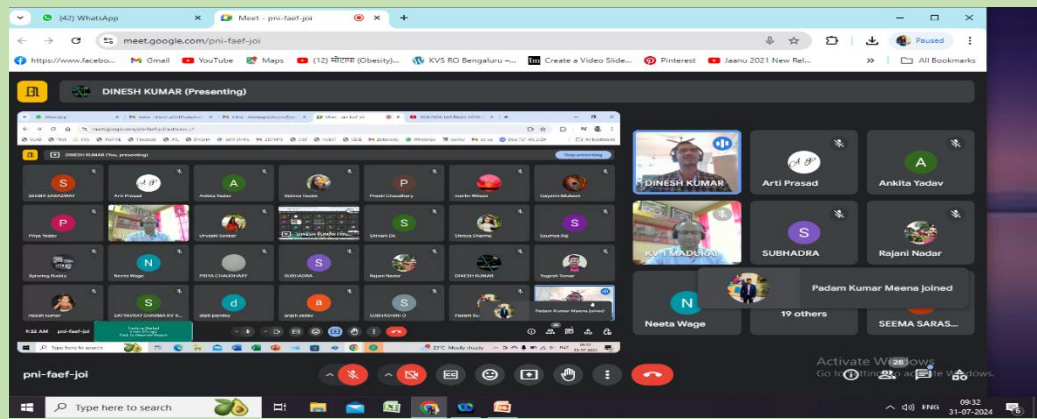
**Stem:** Observe the three containers with seeds in the image. Which condition resulted in the highest rate of germination?

**Options:** A. Roasted seeds  
B. Boiled seeds  
C. Normal seeds  
D. Frozen seeds

**Correct Answer:** C. Normal seeds

## SOME PHOTOS







Meet - pni-faef-joi

Neeta Wage (Presenting)

## DEFINING SCIENTIFIC LITERACY

- The term "scientific literacy" indicates the broad goals of science education. Science education in today's context is not just about curriculum involving content and relevant skills, it encompasses a wide range of abilities that can enable students to engage with their environment and with the society; economically, socially and politically in a range of contexts.
- The aim of teaching and learning science appears to be preparing students for examinations, thus defeating the overall goal of science education.
- The objective of science education is not just to prepare students for specific careers in science but to raise individuals who are literate enough to understand scientific problems that might impact their lives in future.

pni-faef-joi

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10:49  
31-07-2024

Meet - pni-faef-joi

Neeta Wage (Presenting)

## Aspects of scientific literacy in PISA Assessment and Analytical framework

- PISA focuses not only on the evaluation of students' content knowledge in science but also their ability to apply the knowledge to different types of contexts. The contexts are generally set in the areas of concerns, such as health and disease, natural resources, environmental quality, hazards, and the frontiers of science and technology.
- Personal context** includes situations and tasks that arise in students' their peers' and families' daily lives, such as handling of personal hygiene.
- Local context** is related with issues around community and the nation where people live, such as deforestation, soil erosion, loss of biodiversity, etc.
- Global context** is applicable to all the problems and tasks related to global issues, such as global warming, ozone depletion in atmosphere, etc.

pni-faef-joi

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31-07-2024

Meet - pni-faef-joi

Ushma Teotia (Presenting)

## 2. Session 1: Competency-Based Learning for Scientific Literacy

- Facilitator: Mrs. Neeta Wage
- Duration: 10:00 AM - 1:00 PM
- Key Points Covered:
  - Measurability of Competencies: Discussion on whether competencies can be measured and the importance of creating measurable and learner-centric assessments.
  - Assessment Context: Emphasis on assessing content that is relevant to the learner's progress and development.
  - Rubrics: The necessity of having proper rubrics for evaluating each activity to ensure fairness and clarity.
  - PISA Overview: For International Student Assessment.

pni-faef-joi

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31-07-2024

Meet - pni-faef-joi

Ushma Teotia (Presenting)

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  - Rubrics: The necessity of having proper rubrics for evaluating each activity to ensure fairness and clarity.
  - PISA Overview: For International Student Assessment.
  - Science Education vs. Scientific Literacy: Clarification of the distinction between the two concepts.
  - Educational Aims: Learning, understanding, and applying knowledge.

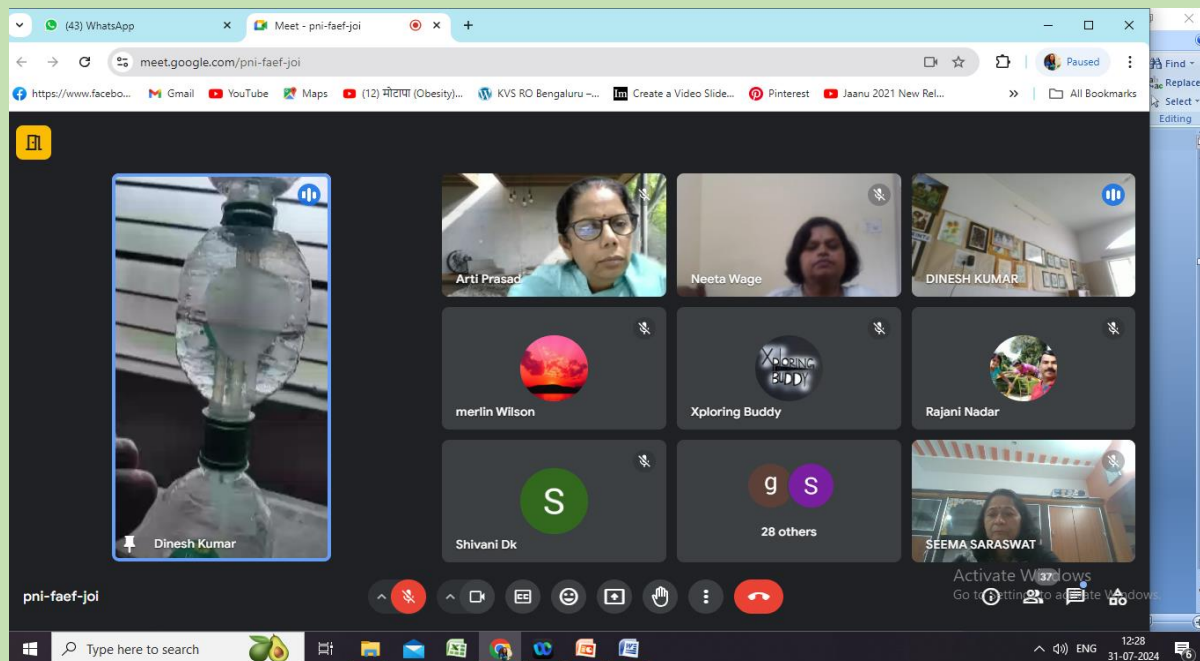
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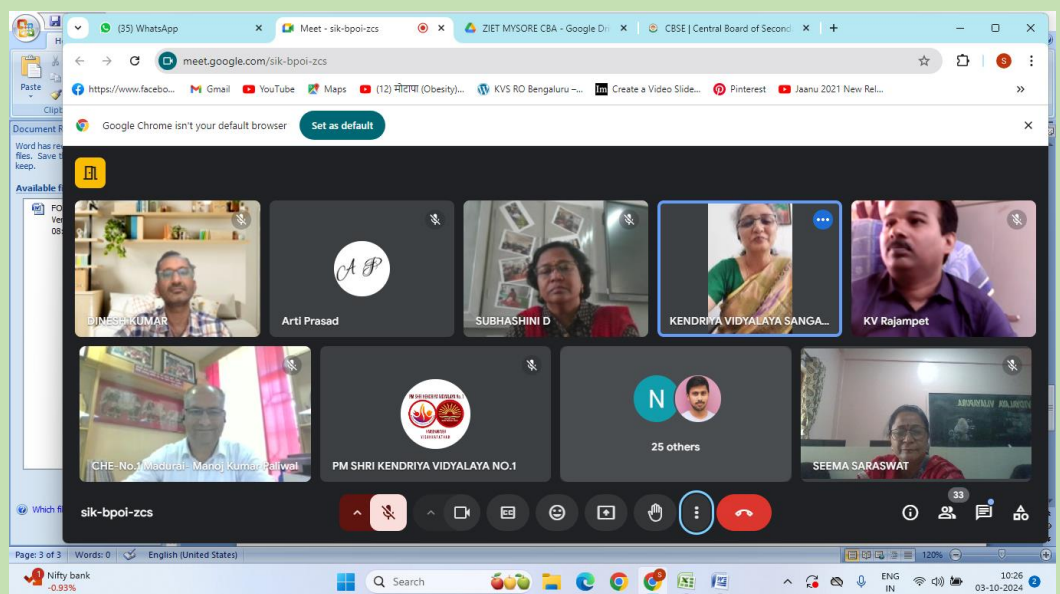
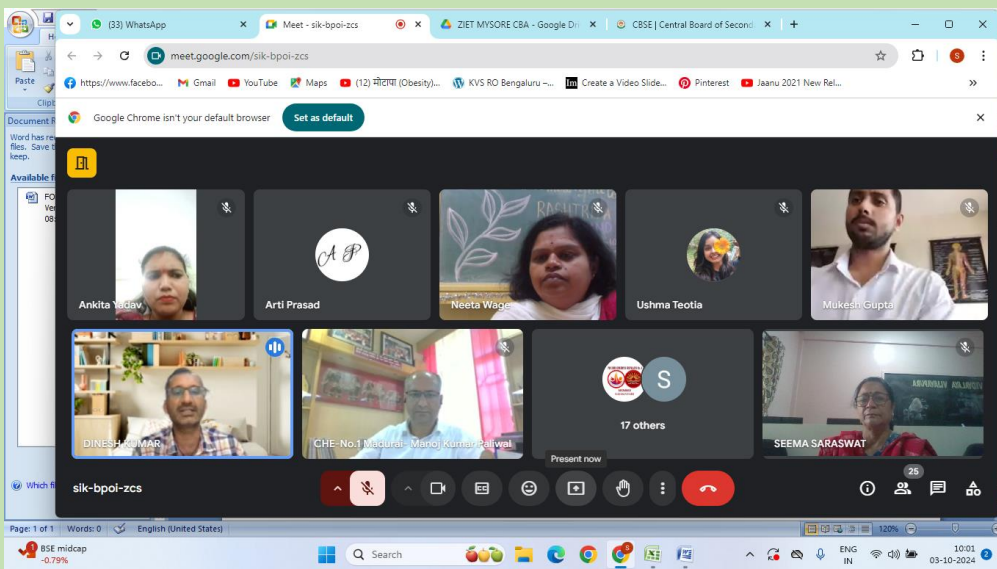
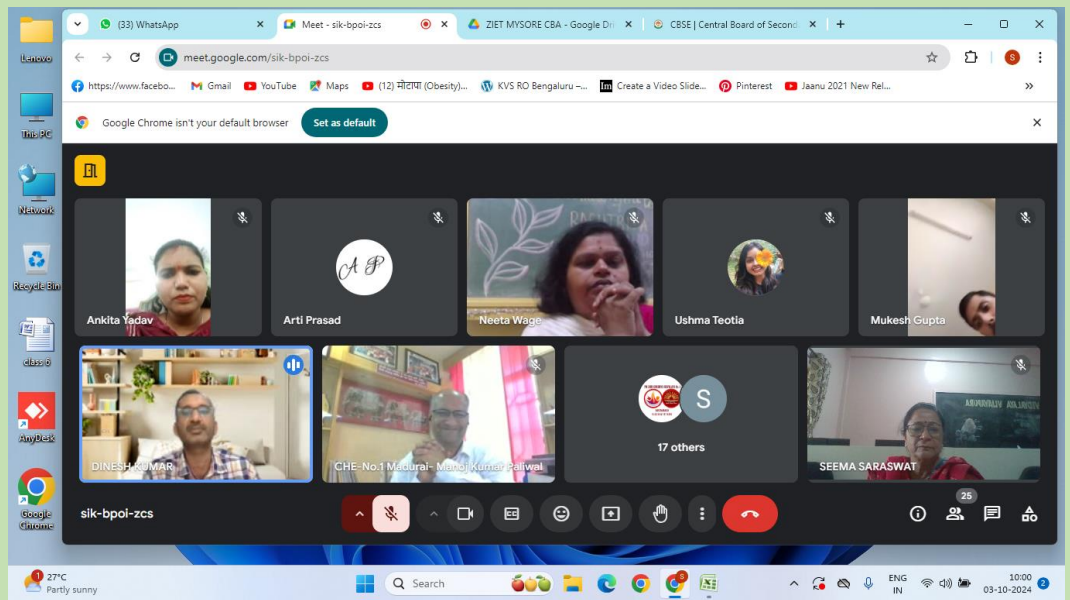
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31-07-2024



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Ushma Teotia (Presenting)

DISCUSSION

## Time to Reflect

Reflective Session of Competency-Based Assessment Workshop  
(31st July - 2nd August, 2024)

Name of the Teacher: Ushma Teotia (TGT Science)  
Class: VIII  
Subject: Science  
Name of the Voluntary PAB Unit/Kendriya Vidyalaya No.1 Jalandhar West, Jalandhar  
JALANDHAR

LEARNING OUTCOMES AND

29 others

SEEMA SARASWAT

10:53 03-10-2024

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Shreya Sharma (Presenting)

Reflective Session on the workshop "Competency Based Assessment in Science: Design of test items"

NAME: SHREYA SHARMA  
SUBJECT: SCIENCE  
CLASS: IX  
SCHOOL: PM SHRI KV NPA  
SHIVAM PALLY

26 others

SEEMA SARASWAT

11:20 AM | sik-bpoi-zcs

27°C Mostly sunny

meet.google.com/sik-bpoi-zcs

Shreya Sharma (Presenting)

Challenges faced and solutions

- Challenges:
  - Some students struggled to grasp the concept of density.
  - Classroom space constraints during the activity
- Solutions:
  - Used simple analogies (e.g. comparing a sponge to a rock) to clarify density.
  - Conducted the experiment in small groups to better manage space and ensure every student could participate.

26 others

SEEMA SARASWAT

11:23 AM | sik-bpoi-zcs

27°C Mostly sunny