

**KENDRIYA VIDYALAYA SANGATHAN**

**ZIET BHUBANESWAR**

**3-Day Workshop on  
Systematic Approach in Teaching**



**Theory & Practical**

**for**

**PGTs in Chemistry**

**26<sup>th</sup> to 28<sup>th</sup> September 2019**

**REPORT**



**Contact Us**

**Kendriya Vidyalaya Sangathan Zonal Institute of Education and Training, Bhubaneswar**

**(MHRD, Government of India)**

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## **Introduction & Background**

Kendriya Vidyalaya Sangathan, as an educational organization committed to quality school education of over a million students, requires to have fully committed and professionally competent teaching staff, who can shape the destinies of the students entrusted to their care. The development of educators as professionals calls for structured and systematic training with a view to equip them with updated knowledge, current skills and enabling attitude so that they perform their duties effectively and efficiently.

Vision of ZIET Bhubaneswar is to enable KVS employees to function as true professionals in the field of school education through training.

Our mission is to provide quality training to equip the Teachers and the Staff with knowledge, skills and attitude required for their professional development in Kendriya Vidyalaya Sangathan so that they contribute to the growth and development of students entrusted to their care.

## Aims & Benefits, Objectives

**AIM OF TRAINING:** to empower participants with the “knowledge & skills of Systematic approach in Teaching” to help them perform their job more effectively to meet the expectation of the KVS in terms of quantity and quality of education.

### **BENEFITS**

#### **TO PARTICIPANTS**

- Bring efficiency and competency in teachers
- Improve in quality of teaching learning in class room
- Teachers will gain job satisfaction
- Change the attitude of the teachers
- Will show enhanced pass % and Performance index (PI)

#### **TO STUDENTS**

- Boost confidence of pupil
- Raise the standard of students achievement
- Ensures pupil achieve their learning objectives and increase the amount of their progress
- Enhance their percentage score

#### **TO**

#### **ORGANISATION:**

- Meet KVS mission of imparting quality education
- Meet KVS mission of pace setting educational organization in Country

#### **TO SOCIETY**

- Society will have more confident and academically sound citizens with strong base

### **LEARNING UNITS & TRAINING OBJECTIVES**

To meet the objectives of the training following four learning unit have been identified-

**Learning unit 1:** Having a clearly written learning Objective of the topic and lesson the teacher is to teach in the class room.

**Learning Unit 2:** Use of appropriate instructional strategy, the teacher is going to use to achieve the learning objective by his pupil as result of teaching

**Learning Unit 3:** Assessment of teaching learning activity in class to know the extent to which learning objectives have been achieved.

**Learning Unit 4:** Evaluation and Refining of the above process for remediation

A learning unit consists of the four major components: Objective, Entry Behaviour, Learning Event and assessment. Further each Learning unit has a Training Objective.

1. **LEARNING UNIT 1:** Having a clearly written learning Objective of the topic and lesson the teacher is to teach in the class room.  
**TRAINING OBJECTIVE 1:** At the end of the training the participants will be able to -State the “**SMART**” objective of the unit/lesson he is going to teach in the class.
2. **LEARNING UNIT2:** Use of appropriate instructional strategy, the teacher is going to use to achieve the learning objective by his pupil as result of teaching.  
**TRAINING OBJECTIVE 2:** At the end of the training the participants will be able to adopt appropriate instructional strategy, the teacher is going to use to achieve the learning objective by his pupil as result of teaching
3. **LEARNING UNIT 3:** Assessment of teaching learning activity in class to know the extent to which learning objectives have been achieved.  
**TRAINING OBJECTIVE 3:** At the end of the training the participants will be able to- adopt authentic practices of assessment to know whether learning objectives has been achieved by every student in the class.
4. **LEARNING UNIT 4:** Evaluation and Refining of the above process for remediation  
**TRAINING OBJECTIVE 4:** At the end of the training the participants will be able to- Measure whether or not the lesson objectives were achieved by every student.

## **ENABLING OBJECTIVES**

1. **LEARNING UNIT 1:** Having a clearly written learning Objective of the topic and lesson the teacher is to teach in the class room.  
**TRAINING OBJECTIVE:** at the end of the training the participants will be to - State the “**SMART**” objective of the unit/lesson he is going to teach in the class.

**ENABLING OBJECTIVES:** At the end of the training participants will be able to-

- EO1.** Define the term ‘Aim’ and ‘Objective’
- EO2.** Explain the differences between aim and objectives
- EO3.** List the essential features of SMART objective.
- EO4.** Write objectives of a topic or lesson he is most confident in teaching

**2. LEARNING UNIT 2:** Use of appropriate instructional strategy, the teacher is going to use to achieve the learning objective by his pupil as result of teaching.

**TRAINING OBJECTIVE 2:** At the end of the training the participants will be able to adopt appropriate instructional strategy; the teacher is going to use to achieve the learning objective by his pupil as result of teaching

**ENABLING OBJECTIVES:** At the end of the training participants will be able to -

**EO1:** Explain advantages and disadvantages of lecture method

**EO2:** Explains advantages and disadvantages of coaching method.

**EO3.** Explain advantages and disadvantages of active learning techniques.

**EO4.** Explain advantages and disadvantages of Group Discussion Method.

**EO5.** Use presentation rubric to evaluate and reflect his presentation.

**3. LEARNING UNIT 3:** Assessment of teaching learning activity in class to know the extent to which learning objectives have been achieved.

**TRAINING OBJECTIVE 3:** At the end of the training the participants will be able to- adopt authentic practices of assessment to know whether learning objectives has been achieved by every student in the class.

**ENABLING OBJECTIVES:** At the end of the training participants will be able to -

**EO1:** describes what authentic assessment is.

**EO2:** list strategies and ideas that can generally apply to assessment in most content areas.

**EO3: design questions to assess achievement of** knowledge based objectives.

**EO4:** design assess tool to check achievement of skill based objectives.

**EO5.** Analyze the assessment data collected to conclude effectiveness of the instructional strategy.

**4. LEARNING UNIT 4:** Evaluation and Refining of the above process for remediation

**TRAINING OBJECTIVE 4:** At the end of the training the participants will be able to- Measure whether or not the lesson objectives were achieved by every student.

**ENABLING OBJECTIVES:** At the end of the training participants will be able to -

**EO1.** Identify the area which needs refining.

**EO2.** Prepare for implementation of the refined plan of instruction.

## LEARNING EVENTS

1. **LEARNING UNIT 1:** Having a clearly written learning Objective of the topic and lesson the teacher is to teach in the class room.

**TRAINING OBJECTIVE:** at the end of the training the participants will be to - State the “**SMART**” objective of the unit/lesson he is going to teach in the class.

**ENABLING OBJECTIVES:** At the end of the training participants will be able to-

**EO1.** Define the term ‘Aim’ and ‘Objective’

**EO2.** Explain the differences between aim and objectives

**EO3.** List the essential features of SMART objective.

**EO4.** Write objectives of a topic or lesson he is most confident in teaching

EO	CONTENT	METHOD	MEDIA	TRAINER	TIME	PERF.AID	AESSMENT
<b>EO1</b>	Aim & Objectives	Discussion, Brain storming’ Programmed learning lecture	White board, pen PPT worksheet	DTS Trained TAs of ZIET	60 min	Hand out & Check list	Informal Questions  (Formative assessment)
<b>EO2</b>	Differences between Aims & Objectives				60 min	Hand out & Check list	
<b>EO3</b>	What is ‘SMART’ objective?				60 min	Hand out & Check list	
<b>EO4</b>	Exercise on writing ‘SMART’ objective				90 min	Programmed learning sheet	
				<b>Total</b>	<b>4.5 hrs.</b>		

**2. LEARNING UNIT 2:** Use of appropriate instructional strategy, the teacher is going to use to achieve the learning objective by his pupil as result of teaching.

**TRAINING OBJECTIVE 2:** At the end of the training the participants will be able to adopt appropriate instructional strategy; the teacher is going to use to achieve the learning objective by his pupil as result of teaching

**ENABLING OBJECTIVES:** At the end of the training participants will be able to -

**EO1:** Explain advantages and disadvantages of lecture method

**EO2:** Explains advantages and disadvantages of coaching method.

**EO3.** Explain advantages and disadvantages of active learning techniques.

**EO4.** Explain advantages and disadvantages of Role Play technique.

**EO5.** Use presentation rubric to reflect his presentation.

E.O.	CONTENT	METHOD	MEDIA	TRAINER	TIME	PERF.AID	AESSMENT
EO1	Lecture method, its advantages & disadvantages	Discussion, lecture, Role Play Brain Storming	PPT, Board, Pen, Worksheet Handouts	DTS Trained TAs of ZIET	60 min	Hand out & Check list	Assignment & Informal Questions  (Formative assessment)  worksheet
EO2	Coaching method , its advantages & disadvantages	Brain storming , Discussion, Lecture, Role Play	PPT, Board, Pen, Worksheet Handouts		60 min	Hand out & Check list	
EO3	Active learning technique, its advantages & disadvantages	Game, Discussion, Lecture, Coaching, Activity	PPT, Board, Pen, Worksheet Handouts		60 min	Hand out & Check list	
EO4	Role Play method, its advantages & disadvantages	Demonstration, Brain Storming, Lecture, Role Play	PPT, Board, Pen, Worksheet Handouts		60 min	Hand out & Check list	
EO5	Use of presentation rubric to reflect teachers presentation	Interaction, Activity, Group discussion	PPT, Board, Pen, Worksheet Handouts		30 min	Hand out & Check list	
<b>Total Time</b>					<b>4.5 hrs</b>		

**3. LEARNING UNIT 3:** Assessment of teaching learning activity in class to know the extent to which learning objectives have been achieved.

**TRAINING OBJECTIVE 3:** At the end of the training the participants will be able to adopt authentic practices of assessment to know whether learning objectives has been achieved by every student in the class.

**ENABLING OBJECTIVES:** At the end of the training participants will be able to –

**EO1:** describes what authentic assessment is.

**EO2:** list strategies and ideas that can generally apply to assessment in most content areas.

**EO3:** design questions to assess achievement of knowledge based objectives.

**EO4:** design assess tool to check achievement of skill based objectives.

**EO5.** Analyze the assessment data collected to conclude effectiveness of the instructional strategy.

S.No.	CONTENT	METHOD	MEDIA	TRAINER	TIME	PERF.AID	AESSMENT
1	What is authentic assessment?	Discussion, lecture, Case study,	PPT, Case study material	DTS Trained TAs of ZIET	60 min	Check list	Assignment & Informal Questions (Formative assessment)
2	Strategies and ideas for student's authentic assessment	Discussion, Case study, lecture,	PPT, Pen & paper		60 min	Handouts & Checklist	
3	Designing questions for assessment of students' knowledge based objective achievement	Discussion, lecture,	PPT, Pen & paper		60 min	Handouts & checklist	
4	Designing tools for assessment of students skill based objective achievement	Discussion, Role Play, Case study, lecture,	PPT, Pen & paper		60 min	Handouts & checklist	
5	Reflective analysis of assessment data	Discussion, Role Play, Case study, lecture,	PPT, video clip	DTS Trained TAs of ZIET	30 min	Handouts	
				<b>Total</b>	<b>4.5 Hrs</b>		

**4. LEARNING UNIT 4:** Evaluation and Refining of the above process for remediation  
**TRAINING OBJECTIVE 4:** At the end of the training the participants will be able to- Measure whether or not the lesson objectives were achieved by every student.

**ENABLING OBJECTIVES:** At the end of the training participants will be able to

–

**EO1.** Identify the area which needs refining.

**EO2.** Prepare for implementation of the refined plan of instruction.

S.No.	CONTENT	METHOD	MEDIA	TRAINER	TIME	PERF.AID	AESSMENT
1	Reflection on whole process to Identify the area which needs refining	Discussion, Video clip, Lecture, Group Discussion	PPT, video clips	Guest faculty from ISTM	120 min	Check list	Informal Questions  (Formative assessment)
2	Preparing for implementation of the refined plan of instruction	Discussion, Video clip, Lecture, Group Discussion	PPT	Guest faculty from ISTM	120 min	Handouts	Informal Questions  (Formative assessment)
				<b>Total</b>	<b>4 Hrs</b>		

## ASSESSMENT

Two kinds of assessment is considered –

- a. **Formative assessment:**
  - i. **Informal questions**
  - ii. **Assignment**
- b. **Summative Assessment:**
  - i. **Assignment**
  - ii. **Demonstration/ role play**

**TRAGET GROUP:**

45 Post Graduate Teachers of Bhubaneswar (11), Kolkata (11), Ranchi (06), Guwahati (08), Silchar (03) and Tinsukia (06) Regions of Kendriya Vidyalaya Sangathan.

**ENTRY BEHAVIOUR:****SIGNIFICANT FACTORS – PRE-REQUISITES:**

- Participant has Post Graduate Degree in the Subject they teach
- B.Ed Degree
- Minimum 06 month to 10 years working experience

**ASSUMPTIONS:**

It is assumed that during their B.Ed course of study, the participants have gone through and possess knowledge of –

- i. Learning Objective
- ii. Learning Style
- iii. Writing Lesson Plan- its importance in effective teaching learning process
- iv. Pedagogy
- v. Teaching styles
- vi. Teacher centric and learner centric teaching
- vii. Learning in ‘Constructivist’ Perspective
- viii. Various methods for Assessment of achievement of learning outcome

**ASSESSMENT OF ENTRY BEHAVIOUR:**

Assessment of the entry behaviour will be done by

1. The inputs received while conducting informal interview with the post graduate teachers (PGTs) teaching XI & XII classes.
2. Through the quiz –Annexure 1

**SMOOTHENING OF ENTRY BEHAVIOUR:**

- By provided Distance/pre learning material (Annexure- 2) for smoothening the entry behaviour.
- Using video clips for skill smoothening shall be used.

**CONSTRAINTS:**

Constraints	Probable Solution	Remarks
There are about 1200 PGTs in Kendriya Vidyalaya under the six feeder regions of ZIET Bhubaneswar. Sparing of all PGTs at one time is a constraint.	45 PGTs of Bhubaneswar (11), Kolkata (11), Ranchi (06), Guwahati (08), Silchar (03) and Tinsukia (06) Regions of KVS shall be trained at a time.	The training shall be continued for ten months/years to train all the PGTs of the feeder regions
Availability of In-house Trainer	Training associates of ZIET are DTS & DOT Trained at ISTM under DOPT Govt. of India.	
Language	Delivery of input in both English and Hindi language	
Material Resources	To be purchased before training is commenced	
Venue	Zonal Institute of Education & Training, Bhubaneswar	

## **PROPOSED TRAINING STRATEGY:**

Keeping into consideration the constraints of the organization for training, the training strategy is planned as below-

- The training shall be for 3 days per batch, 45 Participants in one batch shall be trained
- Training will commence in the month of July- October as per KVS approval
- As the training shall be beneficial for all the PGTs, therefore , the training may be continued for 3-5 years each year two batches one of PGTs (Chemistry) and the other for PGTs ( all subjects except Chemistry) each batch training 45 PGTs,
- each day we have 6 working hours out of which 1 hour for lunch and 30 minutes for refreshment / tea break shall be availed every day effective training time available is 4.5 hours

## **Transfer of Learning:**

During the training, the participants will be asked to prepare an action plan by identifying some specific ideas from the training course which can be applied in his/her job to achieve the expected learning outcome/objective by the students in their class. In the action plan the participants will make a strategy and timetable to implement their ideas. This plan will be discussed with the participants' principal in terms of support available from trainer and higher authority after the course to the participants and this will be get approved/agreed by them during the training.

## **PROPOSED VALIDATION MEASURES:**

<b><u>INTERNAL VALIDATION</u></b>	<b><u>EXTERNAL VALIDATION</u></b>	<b><u>EVALUATION</u></b>
Feedback from trainees will be taken after the course	Principal of the vidyalaya from which participant is coming will compare participants teaching between pre -training & post training performance of the teachers with respect to their knowledge, skill & attitude	<ul style="list-style-type: none"><li>• Through Review session</li><li>• Through Cost benefit analysis</li></ul>

## **TRAINING SESSION PLAN**

<b><u>Learning Unit</u></b>	<b><u>Sessions</u></b>	<b><u>Time</u></b>
<b>1:</b> Having a clearly <b>written learning Objective</b> of the topic and lesson the teacher is to teach in the class room.	4	4.5 Hrs
<b>2:</b> Use of <b>appropriate instructional strategy</b> , the teacher is going to use to achieve the learning objective by his pupil as result of teaching	5	4.5 Hrs
<b>3: Assessment of teaching learning activity</b> in class to know the extent to which learning objectives have been achieved.	5	4.5 Hrs
<b>4: Evaluation and Refining</b> of the above process for remediation	2	4 Hrs

# Workforce

## **Course Director**

**Sri Chandrapida Neelap**

Deputy Commissioner & Director  
ZIET Bhubaneswar

## **Training Coordinator**

Nabaghan Nayak, TA (Mathematics)  
ZIET Bhubaneswar

## **Resource Persons**

Ashok Kumar Gupta, TA (Chemistry)  
ZIET Bhubaneswar

Vishnu Verma, PGT (Chemistry)  
K.V.No.1 HEC Ranchi

## **Supporting Training Associate**

Dr. Abhijit Saha  
Sri Parsuram Shukla  
Sri Rathina Kumar  
Sri Sibranjan Sahoo  
&  
Staff of ZIET Bhubaneswar

**KENDRIYA VIDYALAYA SANGATHAN**  
**Zonal Institute of Education & Training, Bhubaneswar**  
**Title of the workshop “Systematic Approach in Teaching Chemistry- Theory & Practical”**

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**Classroom Teaching Style Survey (Questionnaire)-15 min**

The survey sheet was distributed to the participants and the discussion held online of the following areas

**Classroom teaching style survey**

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In the six items below decide where you fall on a 1-5 scale with the characteristics associated with the range of scores given below that. Keep track of the total score after adding scores from each of the items. Use the total survey score to classify yourself according to the description (to be given later)

<b>1. In my classroom, my goal is to...</b>				
1	2	3	4	5
Provide students with knowledge.		Give students knowledge, but also have them thinking about the material during class.		Have students construct their own knowledge; I am just the facilitator.
<b>2. In my classroom, I typically...</b>				
1	2	3	4	5
Talk for more than 95% of the class.		Talk for no more than 90% of the class.		Talk for no more than 50% of the class.
<b>3. In my classroom, students...</b>				
1	2	3	4	5
Do no activities during class.		Will be actively doing something other than taking notes at least 10% of the class period. They will answer questions, work briefly with some material, or examine images I project. They will provide an answer to a question or problem. They will follow the directions I give them.		Will be actively doing something other than taking notes for >50% of the class project. They will be considering the process of the activity as well as getting an outcome. They may explore with an activity before I present any lecture on a topic.
<b>4. In my classroom, students...</b>				
1	2	3	4	5
Don't talk to each other.		Talk with each other about multiple things but at only one		Talk to each other a lot and in different combinations of students

		scale (just pairs, just small group, just whole class), or just about one thing but at multiple scales (pairs to groups to class as a whole).		(pairs/groups/class as a whole). They debate ideas, evaluate information, reformulate material, predict, and test.
<b>5. I ask students questions...</b>				
1	2	3	4	5
Seeking a specific answer. Some student will answer fairly quickly or I will move on.		Orally or with clickers and I wait for one of them to answer and/or I call on different students to answer. Students should be able to answer my questions if they are learning the material.		And give them lots of time for all to think of their answer. I solicit answers from multiple students. My questions may have multiple answers, will require that they talk to each other, and ask them to explore, critique, analyze, interpret, consider alternative solutions, and develop predictions.
<b>6. In my Class Room Students.....</b>				
1	2	3	4	5
Seldom ask questions, but I answer them if they do.		Ask questions (plural) most every class period and I answer them, and if necessary, put the answer in the context of what we have done.		Ask questions and those questions can change the direction of the class. When they ask a question, I will have other students to suggest and discuss possible answers.

**Total Score**.....

**Name**.....

**Score 6-11:** Traditional/teacher-centered

**Score 12-15:** Transitional/teacher-guided

**Score 16-19:** Transitional/student-influenced

**Score >19:** Reformed/student-centered



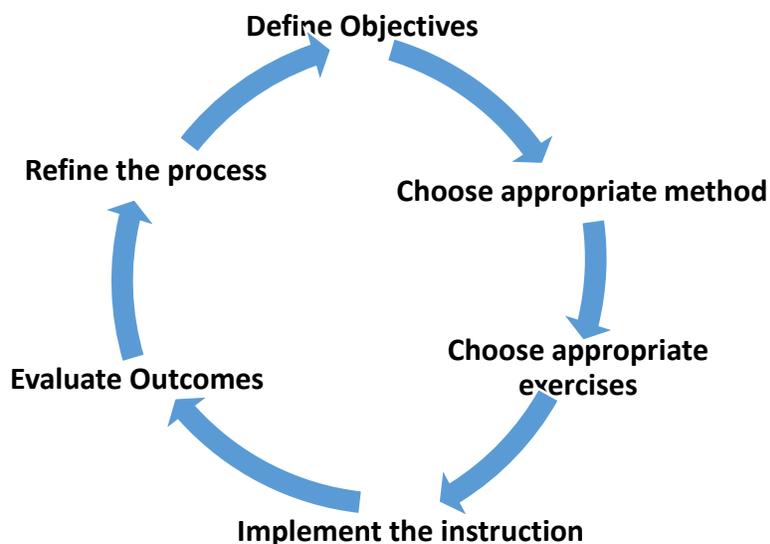
**Day 1, Session 2 Time= 11.15am to 1.00pm 105 Minutes**

### **Systematic approach in Teaching-Part 1**

- What is it?
- Writing learning objective
- Coaching method
- Steps for preparation of coaching method

#### **1. Introduction:**

Look at the diagram. Pay close attention to the parts. Write at least 1/4 statements on the figure.



#### **2. Open discussion on the following terms-**

- What is Learning
- What is Education
- What is Training?

#### **Definition Of `Learning'**

- `Get knowledge or skill, ability to - by study, experience or being taught'
- `Commit to memory'
- `Become aware of information, or ... from observation'
- `Receive instruction ..., become informed'

### **Definition of 'Education '**

- a process of teaching, training and learning, especially in schools or colleges , to improve knowledge and develop skills
- a particular type of teaching or training
- The institutions or people involved in teaching and training
- The subject of study that deals with how to teach
- An interesting experience that teaches you something

### **Definition of 'Training'**

- 'A planned process
- to modify attitude, knowledge or skill
- through learning experience
- to achieve effective performance
- in an activity or range of activities ....
- to satisfy ... needs of organization'

### 3. Learning Objective?

#### AIM AND OBJECTIVES OF TEACHING

**Learning Outcome:** After reading this article you will be able to:

- ✓ Distinguish between Aim and Objectives of TEACHING
- ✓ List the criterion for writing a good objective
- ✓ Classify objectives

Every TEACHING course/session that we conduct has some **Aim** and **Objectives**. Are the two words same or interchangeable? No, in the TEACHING parlance they have separate meanings.

**AIM:** A general statement of what you hope the TEACHING will achieve, expressed in terms of what you, the teacher will be presenting to the learner, whereas;

**OBJECTIVES:** Are statement of what the learner should be able to **DO** (or DO better) on completion of the TEACHING. It is some kind of action that we are demanding from the successful learner. The action could be physical or even mental.

**Examples:**

**AIM:**

- ✓ To highlight the importance of time management to improve overall performance at work.
- ✓ To introduce the learner to the art of *Yoga*.
- ✓ To foster an appreciation of the novels of *MunshiPremchand*.

**OBJECTIVES:**By the end of the TEACHING course/session, the learner will be able to:

- ✓ **Perform** *Suryasana, Savasana* and *Shirshasana*.
- ✓ **Calculate** the pension of a retiring Government servant.
- ✓ **Fix** the pay of a Government servant on promotion.
- ✓ **Draw** pie chart from the given data.

**Writing Objectives:** In writing objectives, we as teachers should indicate, what a successful learner should be able to DO (or perform) to demonstrate that he/she has learned what we wanted him to learn in pursuance of the Aim. Hence the objectives should use “action verbs”. For example, avoid verbs on the left below. Instead use those on the right.

Avoid	Use
Know...	State...
Understand...	Describe...
Really know/understand...	Explain...
Appreciate....	List...
Learn the basics of....	Evaluate...
Obtain working knowledge of...	Distinguish between...
Believe...	Compare....
	Give examples of...
	Apply...
	Use...

All the words used on the left side above hint at non-observable state of mind and hence they will neither be testable nor achievable. However the moment you use words such as state, list, explain the non-observable becomes observable and, therefore, testable also.

You can see that the words on the right are all ACTION VERBS, which tell the learner to DO something. A question may arise in your mind why after all we need an action verb in the objective statement. Okay. Why do we set an objective? Because we want to achieve it. We can say that we have achieved it only after we are able to test it. Unless an action is involved, it may not be possible for us to test. That is the rationale for an action verb. So to express the attributes of an objective we could use the acronym “**ATAL**” –

<b>A</b>	-	<b>Action Verb</b>
<b>T</b>	-	<b>Testable</b>
<b>A</b>	-	<b>Achievable</b>
<b>L</b>	-	<b>Learner Oriented</b>

To make the point clear, let us take an example. Take this objective for a computer course on Microsoft Word.

*“On completion of the TEACHING, the learner will be able to **grasp** the salient features of MS-Word.”*

The learner will ‘grasp’ the salient features. Grasp? Can you observe this objective? Can you measure this objective? Therefore, we should, use some action verb to write the objective, for e.g.

*“The learners will be able to **list** the salient features of MS-Word”.*

If you want to set still higher objectives, then we need to go slightly deeper and set an objective for different stages of TEACHING.

- (i) On their return to work when they are required to perform task to the same standards as those of experienced, competent workers. The objective used to describe this is called “**PERFORMANCE OBJECTIVE**”. Let us say that it is a course on Systematic Approach to TEACHING for TEACHING faculty. So the performance objective would be “The TEACHING faculty will be able to distinguish between TEACHING and non-TEACHING implications after identification of TEACHING needs”.
- (ii) On completion of their formal TEACHING when they have achieved a satisfactory standard of performance under TEACHING-LEARNING conditions. The objective used to describe this is called “**LEARNING OBJECTIVE**”. For the same course on SAT for TEACHING faculty, the LEARNING objective could be “The participants will be able to analyze performance based LEARNING issues and identify TEACHING needs”.
- (iii) On completion of a stage of learning process when they have acquired, certain knowledge or skills. The objective used to describe this is called “**ENABLING OBJECTIVE**”. Again for the same course the Enabling Objective could be “The participants will be able to differentiate between symptoms and causes of the problem”.

Apart from classifying the objectives into performance, learning and enabling objectives, depending on what kind of benefits the learner is expected to get from the TEACHING, the objectives could also be knowledge/skill/attitude based as indicated below:

**Knowledge:** How do you want the learners to demonstrate the knowledge they have gained from the TEACHING? For example, “The learner will be able to explain the importance of Information Technology in Good Governance”.

**Skills:** How would you wish your learners to be able to demonstrate their ability to apply their knowledge of the subject matter? e.g.: “The learner will be able to send a document through Email”.

**Attitude:** What attitude or belief would you wish the learner to develop in respect of the subject of the TEACHING? e.g.: “The learner will be able to agree to the need for improvement...”.

An objective statement can have 3 components to make it a quality objective. These 3 components are **Performance, Conditions and Standards**. The first one is an essential component of all the objective statements; whereas the other two may be added subject to the need of specificity. This means that the objective statement **must** include the performance to be carried out by the learner. If

necessary, the conditions under which that performance must be carried out should also be included. Similarly the acceptable standards of performance a learner must attain, if it needs to be specified may also be added.

Examples of Performance Statements:

- ✓ The learner will be able to type the demi-official letter.
- ✓ The learner will be able to list the steps involved in making a transparency.

Examples of Performance Statements with Conditions:

- ✓ The bank clerk will be able to calculate interest on savings using the ready reckoner.
- ✓ Given a well-illuminated work place, the draftsman will be able to modify the drawings.

Examples of Performance Statements with Conditions and Standards:

- ✓ The clerk will be able to type at not less than 40wpm on a Remington Typewriter.
- ✓ The Inspector will be able to fire 5 rounds within 3 seconds from his service revolver on a 25-yard range.

To sum up, the following conclusions emerge:

- ✓ Aim indicates the teacher's intention;
- ✓ The objective is a statement of what the learner will be able to do after the TEACHING;
- ✓ The objective statement must have an action verb;
- ✓ It should be testable;
- ✓ Achievable; and
- ✓ Learner oriented;
- ✓ The objectives can be classified as Performance, TEACHING and Enabling Objectives;
- ✓ The Objectives could also be knowledge based, skill based and attitude based;
- ✓ To make it a quality statement, the objective must essentially have a performance statement; and
- ✓ Depending upon the need, conditions and standards can also added.

\*\*\*\*\*

**COACHING:**

One of the best and most effective forms of teaching is by means of a one-to-one relationship between a teacher and learner. This is because the teacher can have a close and flexible relationship with the individual learner. This enables a learning event to be developed to suit both the learning needs of the learner and to satisfy performance requirements. The term 'coaching' is used to describe this form of teaching. The Glossary of Teaching Terms defines coaching as:

*"Systematically increasing the ability and experience of the learner by giving him or her planned tasks, coupled with continuous appraisal, advice and counselling by the learner's supervisor."*

In a one-to-one relationship as described in the definition there are two people involved, the 'supervisor' (or the more appropriate word 'teacher') and the 'learner'. We also make reference in the definition to 'planned tasks'. Recognising the considerable impact both has on the success of coaching activities is important. For example:

- \* The teacher has to recognise an individual's teaching needs, and plan an appropriate coaching session.
- \* The planned tasks provide the basis for the teaching needs, and the justification for providing coaching.

**TASKS**The definition for coaching refers to learners being given planned tasks. This draws attention to the learning being work-related and the coaching process intended to improve or develop a person's performance. A task is an element of work leading to a specific result. Here are some examples of tasks:

- Preparing and delivering a lecture
- Calculate Income Tax

- Interviewing a celebrity
- Start a computer
- Writing a letter
- Preparing Plan Proposal
- Formulating Projects

## **PLANNING TASKS**

When planning to increase or change a person's repertoire of tasks the following questions must be carefully considered:

- How well will a new task fit into the person's existing duties and responsibilities?
- How easy or difficult is the new task to learn?
- Are other people performing the task already and is their performance satisfactory?
- If the task is being performed badly by others what affect will this have on the learner?
- If others are performing the task can they assist with coaching duties?
- Is there a clearly defined standard of performance for the particular task?
- Will the learner be keen and willing to learn the task, or is it one being imposed on him or her?
- If the learner is already performing the task, does he or she know that it is not being performed satisfactorily?

Planning a task is therefore not something one does without consideration of these and other questions that might be pertinent to the situation. It is essential to establish a sound reason for asking a person to learn a task, and to ensure that we then provide adequate learning opportunities.

## **TYPES OF TASKS**

The list of tasks given earlier indicates the wide range of tasks to be encountered. Some will be straightforward and relatively easy to learn; others will be more complex, usually involving decision making. We can make a useful distinction between these two types of task:

### **Reproductive Tasks**

These are tasks that are always performed in the same way. Satisfactory performance occurs when the person performing the task follows established procedure, observes all the rule and regulations, accuracy, etc. and in effect, repeats a model performance. For example, each time you start a computer you follow the same procedure - this is a reproductive performance, and would be done in a similar manner by anybody using a computer.

### **Productive Tasks**

These are tasks that require a different performance each time they are done. Two people can perform the same task, and do them differently but correctly. Usually, the reason for this is that a person has to decide and apply a considerable body of knowledge and experience to what might be a unique performance. Also, there is no clear-cut, and definitive 'correct' result. For example, each time you conduct an interview you do it differently,

depending on the individual being interviewed; a colleague could interview the same person and do it differently, but equally successfully.

### **Checklist for coaching method**

#### **Planning**

- Identify task
- Analyse the task
- Identify productive and reproductive elements
- Describe reproductive procedures
- Consider the working environment
- Specify objective to be achieved
- Specify performance assessment
- Consider entry behaviour of learner
- Identify learning needs of learner
- Consider suitable learning event
- Decide time available
- Decide sequence for learning event
- Prepare teaching material

#### **Introduction**

- Gain attention/rapport
- Explain purpose/reason for learning task
- State teaching objective
- Explain procedure for assessment
- Check entry behaviour
- Explain participation/responsibilities for learning event
- Explain how time is to be used
- Describe task and safety/security considerations
- Describe the task within context of working environment
- Identify reproductive/productive elements
- Perform the task where possible
- Demonstrate/explain reproductive elements
- Assist learner to practice reproductive elements
- Check performance of reproductive elements with learner performing and explaining
- Ensure mastery of reproductive elements
- Explain productive elements
- Allow learner to think about and practice productive elements
- Check understanding
- Practice performance of whole task
- Correct errors

#### **End**

- Restate purpose/reason for performing task
- Restate teaching objective
- Invite questions
- Carry out performance assessment
- Give learners feedback on performance
- Thank the learner

- Provide remedial teaching where necessary
- Provide further opportunities for practice

## Coaching method Feedback

<p><b>PURPOSE</b> To observe a person practising a direct training skill, and to give them feedback on their performance.</p> <p><b>PROCEDURE</b> Carefully observe the learning event and record your reaction to each item on the checklist. This can be done by marking the number that most closely matches your view, where:</p> <ol style="list-style-type: none"> <li>1 Indicates that this item was not done.</li> <li>2 Indicates that this item was attempted with room for improvement.</li> <li>3 Indicates that this item was accomplished.</li> </ol> <p>Alongside your reaction to each item, note any comments you consider helpful to the learner</p>	<p><b>Method:</b> Coaching</p> <p><b>Name:</b> _____</p> <p><b>Topic:</b> _____</p> <p><b>Observer:</b> _____</p> <p><b>Date:</b> _____</p> <p><b>Start:</b> _____</p> <p><b>Finish:</b> _____</p>
--	--

ITEM CHECKLIST	REACTIONS			COMMENTS
1. Materials and equipment available and prepared.	1	2	3	
2. Gains attention/establish rapport	1	2	3	
3. Explain purpose/reason for learning	1	2	3	
4. State objective.	1	2	3	
5. Explain participation	1	2	3	
6. Check entry behaviour.	1	2	3	
7. Describe the task.	1	2	3	
8. Perform/demonstrate the task.	1	2	3	
9. Break task into steps for the benefit of learner	1	2	3	
10. Allow learner to practise.	1	2	3	
11. Check understanding by questioning.	1	2	3	
12. Help learner identify and correct errors	1	2	3	
13. Summary	1	2	3	
14. Assess performance/give feedback	1	2	3	
15. Thank the learner	1	2	3	

## List of Participants demonstrating Coaching method, participant role playing as student and the participant role playing as observer

Coach	Student	Observer
Smt Manisha	Sri Sunil Kumar	Sri Nirmalendu Kar

Sri Sushil Kr Singh	Sri Jagdish Prasad Yadav	Sri Prabhu Dayaal
Sh Amit Kumar Gangwar	Sri Raju Ram Meghwal	Sri Brajesh Kumar
Sri Suresh Kumar Sahu	Sri Partho Moitra	Sri Vikash Kumar Suman
Mrs Gayatri Mishra	Smt Babli Banrman	Sri Govind Singh
Sri Sunil Vadela	Sri Amit Kumar	Sri Sanak Meher
Sri Robin Banerjee	Sri Rajesh ram Singh	Sri Sandeep Datta
Sri Sunil Kr Rawat	Smt Nupur Banerjee	Sri Ankit Gupta

## Fundamentals of mole concept

A convenient amount unit for expressing very large numbers of atoms or molecules is the mole. Experimental measurements have determined the number of entities composing 1 mole of substance to be  $6.022 \times 10^{23}$ , a quantity called Avogadro's number. The mass in grams of 1 mole of substance is its molar mass. Due to the use of the same reference substance in defining the atomic mass unit and the mole, the formula mass (amu) and molar mass (g/mol) for any substance are numerically equivalent (for example, one H<sub>2</sub>O molecule weighs approximately 18 amu and 1 mole of H<sub>2</sub>O molecules weighs approximately 18 g).

## Stoichiometry and limiting reagent with special emphasis on numerical skill

### Tips for answering reasoning questions of p-block elements

#### Skill Developing Problems

1. Which of the following will react most vigorously with Cl<sub>2</sub>?

Li, Na, K, Fe, Al, Mg, or Ar?

**Hint:** Potassium, K

**Skill -** Predict reactivity from location of element in the periodic table.

2. One mole of Cl<sub>2</sub> molecules would react with how many moles of Na metal?

**Hint:** Two moles

**Skill -** Write a reaction equation for a chemical reaction.

3. At room temperature (25 °C) what is the state of sodium: solid, gas or liquid?

**Hint:** Solid

**Skill -** Know where to look up properties of elements or substances.

4. Which of the following is the best conductor: sodium metal, solid NaCl, chlorine gas, dilute NaCl solution, or molten NaCl ?

**Hint:** Sodium metal

5. What positive ions are present in solutions of NaCl?

Hint: sodium ions

6. **If you put equal weights of sodium metal and chlorine gas into a reaction vessel, which is the limiting reagent?**

Hint: chlorine is the limiting reagent

**Skill** - Identify excess and limiting reagent.

7. **Equal weights of H<sub>2</sub> and O<sub>2</sub> are placed in a balloon and then ignited. Assuming reaction goes to completion, which gas is the excess reagent?**

Hint: hydrogen

8. **Equal weights of H<sub>2</sub> and F<sub>2</sub> are placed in a balloon and then ignited. Assuming reaction goes to completion, which gas is the limiting reagent?**

Hint: Fluorine

**Skill** - Identify the excess and limiting reagent.

## Precipitation reactions

In this activity, students select diagrams that best represent the arrangement of ions before and after two solutions are mixed to form a precipitate. The diagrams focus thinking and discussion about precipitation reactions. They observe and interpret a practical demonstration and use ideas about particles to explain their observations.

### Learning objectives

Students will be able to:

1. Explain and complete ionic equations to show how insoluble salts are made by precipitation.

### Sequence of activities

Explain that you are going to mix together solutions of sodium chloride and silver nitrate which react together to produce insoluble silver chloride.

Issue a mini whiteboard to each student.

Ask:

- students to draw diagrams with labels to predict what will happen
- some students to show their ideas.

Demonstrate mixing sodium chloride solution and silver nitrate solution using large volumes of solution so that the formation of a precipitate is clear and dramatic.

- Use questions to focus attention on the particles involved as a means of sharing the learning objectives with students.



Organise students into pairs.

Give one copy of *Precipitation reaction diagrams* to each pair and one *Precipitation reaction* sheet to each student.

Task students to:

- choose a diagram that they think best represents the particles present in
  - the two separate solutions before mixing and
  - the solid and solution after mixing equal amounts of sodium chloride and silver nitrate solutions
- record their choices on their *Precipitation reaction* sheet and explain why they made these choices.



Bring students to a plenary. Ask:

- some students to describe and explain their choices
- other students to add to these ideas
- all students to write, on their mini whiteboard, an ionic equation to represent the mixing of solutions of sodium chloride and silver nitrate
- students to show their equations
- questions to reinforce the expected ionic equation
- students to use these ideas to write down the 'missing' parts of the three ionic equations on their *Precipitation reaction* sheet
- for answers and ensure that all students have a record of the expected answers
- students to identify what they have learnt from the session and to complete that section on their *Precipitation reaction* sheet.



Take in the *Precipitation reaction* sheets and comment on the positive achievement shown by their explanations of their choice of diagram. Where appropriate, suggest how they might develop their understanding about precipitation reactions.



### Assessment for learning commentary

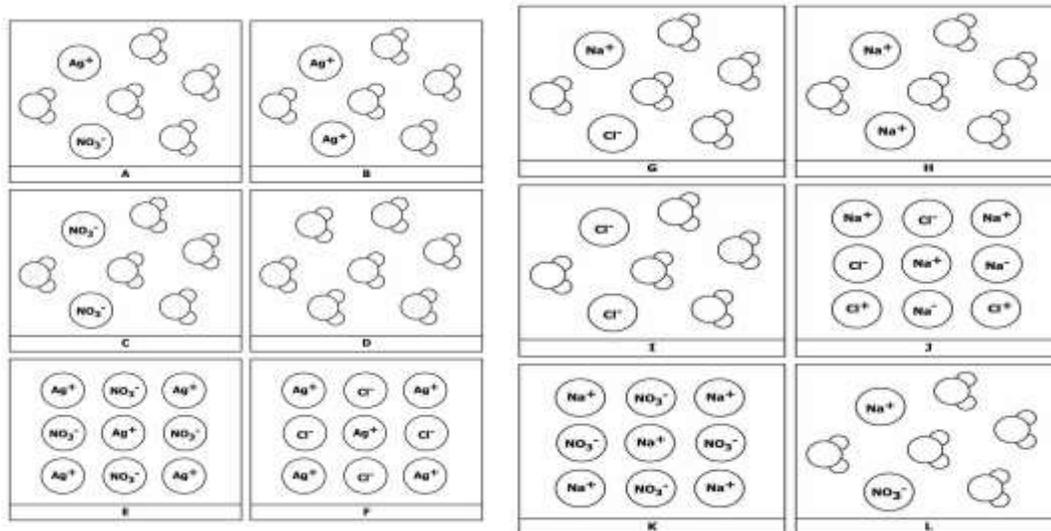
The initial demonstration enables the teacher to vividly share the lesson objectives with students.

Students listen to the ideas of others and articulate their own ideas about precipitation reactions. This gives them a basis on which to judge what they have learnt.

Relevant feedback will correct misunderstandings as well as helping the student to move forward.

### Resources

### Precipitation Reaction diagrams



### Answers

*I think that the particles in sodium chloride solution are best represented by **diagram G***  
 Diagram G contains sodium ions, chloride ions and water molecules.

*I think that the particles in silver nitrate solution are best represented by **diagram A***  
 Diagram A contains silver ions, nitrate ions and water molecules.

*I think that the particles in the solid, produced when equal amounts of sodium chloride and silver nitrate solutions are mixed, are best represented by **diagram E***  
 Diagram E contains silver ions and chloride ions in a lattice. The sodium and nitrate ions are still in solution.

*I think that the particles in the solution, left behind when equal amounts of sodium chloride and silver nitrate solutions are mixed, are best represented by **diagram L***  
 Diagram L contains sodium ions, nitrate ions and water molecules. The silver and chloride ions have been removed as a solid.

1.	$\text{Pb}^{2+}(\text{aq})$	+	$2\text{I}^{-}(\text{aq})$	$\rightarrow$	$\text{PbI}_2(\text{s})$
2.	$\text{Ba}^{2+}(\text{aq})$	+	$\text{SO}_4^{2-}(\text{aq})$	$\rightarrow$	$\text{BaSO}_4(\text{s})$
3.	$\text{Cu}^{2+}(\text{aq})$	+	$\text{OH}^{-}(\text{aq})$	$\rightarrow$	$\text{Cu}(\text{OH})_2(\text{s})$

## **LECTURE METHOD**

Lectures have been used since ancient times as a convenient method of communicating information to a large number of people. Lecture can become more efficient by making use of a better understanding of how people learn and by using visual aids.

A lecture gives learners specific information that is usually task & curriculum -related. The learners need the information for their work and to enable them to respond accurately to the situation they are put in during assessment. If they don't need the information there is no justification for attending the lecture. A lecture for teaching purposes should have a clear focus with a specific objective. The information you are providing should be essential to the learners' performance and, taking an extreme position, failure to learn the information will affect their performance.

The Glossary of Training Terms tells us that a lecture is:

*"A straight talk or exposition, possibly using visual or other aids, but without group participation other than through questions at the conclusion."*

## **STAGES INVOLVED IN PREPARING A LECTURE**

- The Objective of a Lecture
- Entry Behaviour
- The Learning Event
- Deciding the Content
- Planning the Sequence
- Planning for Maximum Recall
- Structuring the Lecture
- Use of Visual Aids
- Performance Assessment
- Review
- Feedback

### **Checklist for Lecture**

- Identify topic
- Prepare a spray diagram
- Edit spray diagram to identify 'must' items
- Express must items as an objective
- Consider entry behaviour of trainees
- Consider size of group
- Decide structure to be used
- Consider visual aid hardware available
- Prepare formal visual presentation of major points
- Consider informal visual aids
- Decide when to invite questions
- Decide timing
- Decide how learning/performance is to be assessed
- Write lecture notes
- Check timing

- Check accommodation
- Check equipment

**The name of the participants to demonstrate lecture method and to act as observer was drawn by lottery**

<b>Lecturer</b>	<b>Observer</b>
Sri Parbhudayal	Dr Ajay Mukhopadhyay
Sri G.Pratibhan	Mrs Monalisa Das
Sri Anwarul Haque	Sri Nirmalendu Kar
Smt Gita Kumari Thapa	Sri raju Ram Meghwal
Sri Ujjwal Kr Banerjee	Sri Amit Kumar
Smt Nupur Banerjee	Sri Govind Singh
Sri Jagdish Prasad Yadav	Sri Partho Maitra
Sri Brajesh Kumar	Miss Gopi Priya V
Sri Ankit Gupta	Mrs A. Meerabai
Sri Sunil Kumar	Sri Vikash Kumar Suman

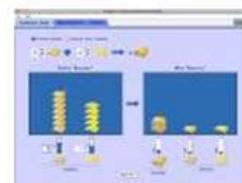


## Basic Stoichiometry PhET Lab

Let's make some sandwiches!

### Introduction:

When we bake/cook something, we use a specific amount of each ingredient. Imagine if you made a batch of cookies and used way too many eggs, or not enough sugar. YUCK! In chemistry, reactions proceed with very specific recipes. The study of these recipes is *stoichiometry*. When the reactants are present in the correct amounts, the reaction will produce products. What happens if there are more or less of some of the reactants present?



Reactants, Products and Leftovers

**Vocabulary:** Before you begin, please define the following:

- Limiting Reactant: \_\_\_\_\_
- Excess Reactant: \_\_\_\_\_
- Synthesis Reaction: \_\_\_\_\_
- Combustion Reaction: \_\_\_\_\_
- Mole Ratio: \_\_\_\_\_
- Diatomic Molecule: \_\_\_\_\_
- Mole: \_\_\_\_\_
- Hydrocarbon: \_\_\_\_\_

**Procedure:** PhET Simulations → Play with the Sims → Chemistry → Reactants, Products, and Leftovers [Run Now!](#)

If a yellow bar drops down in your browser, click on it and select "Allow Blocked Content"

### Part 1: Making Sandwiches: Sandwich Shop

- The Cheese Sandwich is a simulation of a two-reactant *synthesis* reaction. In this case, one reactant will be *limiting*, while the other will be in excess.
- Take some time and familiarize yourself with the simulation.



- Set the reaction to a simple mole ratio of 2:1:1
- Complete the table below while making tasty cheese sandwiches:

Bread Used	Cheese Used	Sandwiches Made	Excess Bread	Excess Cheese

5 slices	5 slices			
4 slices	3slices			
		2 sandwiches	1 slice	0 slices
6 slices		3 sandwiches		4 slices

**Part 2: Real Chemical Reactions:**

**Real Reaction**

5. Now let's work with real chemical reaction, one that creates a very entertaining BOOM!  
 6. What is the mole ratio for the reaction of hydrogen and oxygen to produce water?



7. Complete the table below while making water H<sub>2</sub>O from hydrogen H<sub>2</sub> and oxygen O<sub>2</sub>:

Hydrogen Molecules H <sub>2</sub>	Oxygen Molecules O <sub>2</sub>	Water Molecules H <sub>2</sub> O	Excess H <sub>2</sub>	Excess O <sub>2</sub>
4 molecules	4 molecules			
7 molecules	6 molecules			
		4 molecules	0 molecules	0 molecules
9 moles	8 moles			
		4 moles	1 moles	0 moles
4.0 moles	2.5 moles			
1.5 moles		1.5 moles	0 moles	0 moles

8. Notice that the labels changed from **molecules** to **moles**. This does not change the mole ratio, as a mole is simply a large number of molecules. How many molecules is a mole? \_\_\_\_\_



9. Now try producing **ammonia**, a very important chemical in industry and farming.  
 10. What is the mole ratio for the production of ammonia?  $\underline{\quad} N_2 + \underline{\quad} H_2 \rightarrow \underline{\quad} NH_3$

11. Complete the table below:

Moles N <sub>2</sub>	Moles H <sub>2</sub>	Moles NH <sub>3</sub>	Excess N <sub>2</sub>	Excess H <sub>2</sub>
3 moles	6 moles			

6 moles	3 moles			
		4 moles	2 moles	0 moles
1.5 moles	4.0 moles			

12. Combustion of **hydrocarbons** like methane  $\text{CH}_4$  produces two products, water and carbon dioxide  $\text{CO}_2$ .

13. What is the mole ratio for the combustion of methane?  $\text{CH}_4 + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$

14. Complete the table below: **WATCH FOR FRACTIONS**

mol $\text{CH}_4$	mol $\text{O}_2$	mol $\text{CO}_2$	mol $\text{H}_2\text{O}$	Excess mol $\text{CH}_4$	Excess mol $\text{O}_2$
4 mol	4 mol				
3 mol	6 mol				
		2 mol	4 mol		
		3 mol			

15. **The BEST PART:** Challenge other members of your lab group to the **Game!**

Your First Score: \_\_\_\_\_ |v| Your Best Score: \_\_\_\_\_ |v| Your Lab Group's Best Score: \_\_\_\_\_ |v|

*You may take this lab home to help you with the post-lab homework sheet, due next time.*

#### **Basic Stoichiometry Post-Lab Homework Exercises**

1. Load the "Reactants, Products, and Leftovers" simulation and work through each of the levels of the **Game!** At home, you can find the simulation by going to <http://phet.colorado.edu/> or googling "phet." You may have to download or update the version of *Java* on your computer.

Complete each exercise on your own. Remember to use proper units and labels.

2. For the reaction  $\text{N}_2 + \text{O}_2 \rightarrow \text{NO}_2$  determine the correct lowest mole ratio.

3. For the reaction  $\text{SO}_2 + \text{O}_2 \rightarrow \text{SO}_3$  determine the correct lowest mole ratio.

4. For the reaction  $\text{P}_4 + 6\text{Cl}_2 \rightarrow 4\text{PCl}_3$ , determine how many moles of chlorine  $\text{Cl}_2$  would be needed to react with 3 moles of phosphorus  $\text{P}_4$  to entirely use up all the phosphorus. 4) \_\_\_\_\_

5. If 5 moles of  $\text{P}_4$  reacted with 22 moles  $\text{Cl}_2$  according to the above reaction, determine:

a) How many moles  $\text{PCl}_3$  are produced a) \_\_\_\_\_

b) How many moles of  $P_4$  are left in excess after the reaction (if any) b) \_\_\_\_\_

c) How many moles of  $Cl_2$  are left in excess after the reaction (if any) c) \_\_\_\_\_

In reality, reactants don't have to react in perfect whole-numbers of moles. In a two-reactant synthesis reaction, usually **one reactant gets entirely used up (and determines how much product is made)**, even if that means using fractions of a mole of reactant. For instance, when solid, metallic aluminum Al and red, liquid bromine  $Br_2$  are brought together, they make a white solid according to the reaction  $2Al + 3Br_2 \rightarrow 2AlBr_3$ . If 5.0 moles of aluminum Al was reacted with 10 moles bromine  $Br_2$ , all five moles of aluminum would react, with only 7.5 moles bromine. (2:3 mole ratio) This would produce only 5.0 moles of  $AlBr_3$ , leaving 2.5 moles of excess  $Br_2$  behind.

6. Now assume 3 moles Al and 4 moles  $Br_2$  react

a) Which chemical is the limiting reactant? a) \_\_\_\_\_

b) Which chemical must be the *excess reactant*? b) \_\_\_\_\_

c) How much (in moles)  $AlBr_3$  gets produced? c) \_\_\_\_\_

SHOW WORK HERE:

d) If all the limiting reactant gets used up, how much of the excess reactant is left? d) \_\_\_\_\_

SHOW WORK HERE:

7. What is the maximum amount (in moles) of NaCl that can be produced from 4.5 moles of Na and 3.5 moles of  $Cl_2$  according to the reaction  $\_\_ Na + \_\_ Cl_2 \rightarrow \_\_ NaCl$  (left for you to balance).

SHOW WORK HERE:

7) \_\_\_\_\_

KENDRIYA VIDYALAYA SANGATHAN-ZIET-BHUBANESWAR

3-Day Workshop on "Systematic approach in Teaching Chemistry- Theory & Practical" for PGTs in Chemistry

Date: 26<sup>th</sup> to 28<sup>th</sup> September 2019, Venue: KVS, ZIET Bhubaneswar

TIME- TABLE

Day/Date	9-00 to 9-15 am	9-00 to 10-45am	10-45 to 11.15 am	11.15 to 1.00pm	1.00 to 2.00pm	2.00pm to 3.30pm	3.30 to 4.00 pm	4.00 to 5.30 pm
26/092019 Thursday	9-15 am	Registration Inauguration-Outline of the course, Blessing by Director ZIET Director	11.15 am	Systematic approach in Teaching-Part 1 <ul style="list-style-type: none"> <li>• What is it?</li> <li>• Writing learning objective</li> <li>• Coaching method</li> <li>• Steps for preparation of coaching method</li> </ul>	2.00pm	Fundamentals of mole concept, stoichiometry and limiting reagent with special emphasis on numerical skill Tips for answering reasoning questions of p-block elements	4.00 pm	Chemical misconceptions - prevention, diagnosis and cure classroom resources (Precipitation Reaction)
		Classroom Teaching Style Survey (Questionnaire)-15 min Knowledge, Concept, Skill & Application Gap Analysis-30 min (Through Quizziz.com) Division of participants into 8 Groups		A.K.Gupta, TA		Vishnu Verma, RP		
27/09/2019 Friday	P R A Y E R	A.K.Gupta, TA & Vishnu Verma, RP	T E A  B R E A K	Organic Chemistry- Solving word problems, conversions & reaction mechanism made easy	L U N C H  B R E A K	Systematic approach in Teaching-Part 2 <ul style="list-style-type: none"> <li>• Advantages &amp; disadvantages of coaching method</li> <li>• Lecture method</li> <li>• Active learning</li> <li>• Authentic assessment &amp; feedback</li> </ul>	T e a  B r e a k	Significance of simple Experiments to develop concept and inspire inquisitiveness
		A.K.Gupta & V. Verma		Vishnu Verma, RP		A.K.Gupta, TA		
28/09/2019 Saturday		Demo class by participants of group 1-8 on Coaching method		Use of ICT Tutorial on phet laboratory		Chemical Equilibrium Developing competency to solve numerical.		Valedictory, feedback and impressions by the participants
		A.K.Gupta, TA & Vishnu Verma, RP		A.K.Gupta, TA		Vishnu Verma, RP		

DIRECTOR

### **REPORT OF DAY 1 (26/09/2019, Thursday)**

The 1<sup>ST</sup> day of the workshop on “Systematic approach in Teaching Chemistry” for PGT Chemistry started at 9am with registration of participants. Then inaugural of the workshop was done by Hon’ble C. Neelap, Director, ZIET Bhubaneswar by enlighten of lamp followed by morning assembly & then introduction of participants.

Hon’ble Director, ZIET Bhubaneswar addressed the participants explaining the purpose of this workshop which is essential for extension & renewal of knowledge which ultimately leads to the growth of personality. He also advised participants to adopt/adjust the learning style of students for effective teaching learning process. Just after that, class room teaching style and knowledge, concept & skill of participants was tested by our dynamic training associate, Mr. A.K.Gupta, through Quizzizz.com which was very informative and also will encourage students to gain knowledge. Then there was a short tea break, after tea breaks the class continued by Gupta Sir where systematic approach in teaching was discussed giving emphasis on learning, education & training. All participants kept their views to differentiate these words. Thereafter was lunch break.

After lunch, resource person Mr. Vishnu Verma discussed some fundamentals of mole concept, different tricks & formula to calculate concentration of solution some tips for answering reasoning question of p-Block. Then there was tea break at 3.30 pm. After tea break, a highly interactive session was again taken by Mr. A.K. Gupta on Chemical misconception by taking an example of precipitation reaction adopting active learning strategy in class room where he involved all participants actively in different activities showing how to make class interactive and interesting.. Then different small activities was allotted to all participants for next day.

The first day came to an end at 5.30 pm & participants departed with a happy note of satisfaction along with some homework.

### **REPORT OF DAY 2 (27/09/2019 Friday)**

The day started at 9am with the morning assembly conducted by Participants of Bhubaneswar region. Then the name of the participants to demonstrate “Coaching Method” was drawn along with the name of the participants to enact as Coachee and the observer.

Then all the 8 groups of the Coach-Coachee and Observer were assigned a proper seating arrangement and were provided with coaching method check list and Coaching Method observation sheet.

The participating teachers demonstrated coaching method on the topic and was observed by the participant and at the end the observer presented the observation.

<b>Coach</b>	<b>Student</b>	<b>Observer</b>
Smt Manisha	Sri Sunil Kumar	Sri Nirmalendu Kar

Sri Sushil Kr Singh	Sri Jagdish Prasad Yadav	Sri Prabhu Dayaal
Sh Amit Kumar Gangwar	Sri Raju Ram Meghwal	Sri Brajesh Kumar
Sri Suresh Kumar Sahu	Sri Partho Moitra	Sri Vikash Kumar Suman
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Sri Sunil Vadela	Sri Amit Kumar	Sri Sanak Meher
Sri Robin Banerjee	Sri Rajesh ram Singh	Sri Sandeep Datta
Sri Sunil Kr Rawat	Smt Nupur Banerjee	Sri Ankit Gupta

After Tea Break Mr Vishnu Verma, PGT Chemistry KV No1 HEC Ranchi delivered lecture on Organic Chemistry, mainly tips for solving word problems, conversion and reaction mechanism.

After lunch break Mr A. K. Gupta, TA (Chemistry) discussed the advantages and limitations of Coaching Method. It was interactive discussion leading to another method of teaching - Lecture Method. He also discussed in details does and don'ts of lecture, structure of lecture and also provided us with check list for developing and conduction teaching learning by lecture method.

Then there was a session on significance of simple experiments to develop concept and inspire inquisitiveness amongst the participants.

The day ended with the demonstration of 7 simple experiments by Resource person Sri A. K Gupta followed by the demonstration by the participants on rotation to ensure every participant performs all the experiment.

### **REPORT OF DAY 3 (28/09/2019 Saturday)**

The day started with a wonderful morning assembly programme conducted by the participants of Guwahati region. After the assembly, very nice & energetic Demo classes were presented by participants on Lecture method.

The name of the participants to demonstrate lecture method and to act as observer was drawn by lottery

<b>Lecturer</b>	<b>Observer</b>
Sri Parbhudayal	Dr Ajay Mukhopadhyay
Sri G.Pratibhan	Mrs Monalisa Das
Sri Anwarul Haque	Sri Nirmalendu Kar
Smt Gita Kumari Thapa	Sri raju Ram Meghwal
Sri Ujjwal Kr Banerjee	Sri Amit Kumar
Smt Nupur Banerjee	Sri Govind Singh
Sri Jagdish Prasad Yadav	Sri Partho Maitra

Sri Brajesh Kumar	Miss Gopi Priya V
Sri Ankit Gupta	Mrs A. Meerabai
Sri Sunil Kumar	Sri Vikash Kumar Suman

The Demo Lecture Class continued till 1pm. We had delicious lunch, after lunch break, a session on developing competency to solve numericals on chemical equilibrium was taken by RP Sri Vishnu Verma PGT Chemistry.

Then a very informative & useful session was given by one of the participant, Sri S. K. Sahoo on how to get content for different topics from different sites.

A useful session on use of ICT and tutorial on phet laboratory was conducted by our training associate Sri A.K. Gupta. It was a very useful session for all of us.

The valedictory function was held after tea break and the certificate and the group photograph was distributed by honorable Director ZIET Bhubaneswar.

## Topics for Coaching Method demonstration

Sr. No.	Topic	Learning Objective	Name of Teacher
1	Reaction of oxalic acid and baking soda.	<b>After coaching learner will be able to –</b> <ul style="list-style-type: none"> <li>Demonstrate the role of solvent in the reaction between Oxalic acid &amp; Baking Soda</li> <li>Describe the role of solvent in the reaction between Oxalic acid &amp; Baking Soda</li> </ul>	Partha Maitra PGT (Chemistry) NTPC Farakka, Kolkata Region
2	Tyndal Effect	<b>At the end of this lesson student should be able to –</b> <ol style="list-style-type: none"> <li>Classify the phases present in a colloidal solution,</li> <li>List the dispersed phase and the dispersal medium in a sol</li> <li>What is Tyndal effect</li> <li>Give two examples of for daily phenomenon based on Tyndal effect</li> <li>Why diameter of dispersed particles is not much smaller than the wave length of the light used.</li> </ol>	Mr Sunil Vodela , PGT Chemistry KV Happy Valley Silchar
3	Mole concept	<ul style="list-style-type: none"> <li>To be able to convert mole into mass, no of atoms/molecules and volume</li> <li>To solve short numericals relating to Mole → Mass → Volume → No. of particles</li> </ul>	Mr Sushil Kumar Singh PGT Chemistry KV Hasimara Kolkata
4	Equilibrium	<b>Learner will be able to</b> <ol style="list-style-type: none"> <li>Demonstrate equilibrium.</li> <li>Explain equilibrium is dynamic in nature.</li> <li>Explain the condition of equilibrium</li> </ol>	Mr Amit Kumar Gangwar , PGT Chemistry KV Tezu Silchar
5	Colloids	<b>Learner will be able to</b> <ol style="list-style-type: none"> <li>Explain – Multi molecular, Macromolecular and associated Colloids</li> <li>Differentiate – Multi molecular, Macromolecular and associated Colloids</li> </ol>	Mr Suresh Kr Sahoo PGT Chemistry KV Khorda Rd
6	Functional groups	<b>Learner will be able to</b> <ol style="list-style-type: none"> <li>Identify the phenolic –OH group by suitable test</li> <li>Identify the carboxylic –COOH functional group by suitable test</li> </ol>	Mr Sunil Kumar Ravat PGT (Chemistry) KV RRL Jorhat
7	Solution	After completion of this session students will be able to prepare solution, suspension and colloid	Robin Banerjee K.V.No.1 Binnaguri
8	Conformers	<b>After completion of this session students will be able to-</b> <ol style="list-style-type: none"> <li>Explain what are conformers</li> <li>Distinguish between staggered and eclipsed conformation of ethane</li> <li>Form staggered and eclipsed conformation of butane</li> </ol>	Mr Geetansh Sethi KV Simdega
9	Geometrical Isomerism	<b>After completion of this session students will be able to-</b> <ol style="list-style-type: none"> <li>Distinguish between geometrical Isomerism in alkenes and cycloalkanes</li> <li>Compare between G.I. and O.I.</li> <li>Explain why it happens and what are conditions related to G.I.</li> </ol>	Mr Chetan Singh PGT Chemistry K.V. Gumla

10	Test for CH <sub>3</sub> COOH	<b>After this coaching session student will be able to-</b> <ol style="list-style-type: none"> <li>1. Name the chemicals required to perform the test of –COOH functional group</li> <li>2. perform the test of –COOH functional group</li> <li>3. note the observation</li> </ol>	Mrs Gayatri Mishra PGT Chemistry KV No1 Sambalpur
11	Boyles law	<b>After this coaching session student will be able to-</b> <ol style="list-style-type: none"> <li>1. state Boyles Law</li> <li>2. Write numerical expression for it.</li> <li>3. Draw graph between P vs V</li> <li>4. Interpret the graph</li> <li>5. Solve numerical problems based on Boyles' s law</li> </ol>	Smt Manisha Mishra PGT Chemistry
12	Addition of hydrogen halide in alkene	<b>Learning Objectives-</b> <ol style="list-style-type: none"> <li>1. Students will be able to explain the mechanism of addition of hydrogen halide in alkene.</li> <li>2. They will be able to predict the product</li> <li>3. They will be able to state Markownikov's rule</li> </ol>	Smt Monalisa Das PGT Chemistry KV Barpeta

# KENDRIYA VIDYALAYA SANGATHAN

## Zonal Institute of Education & Training, Bhubaneswar

Title of the workshop "Systematic Approach in Teaching Chemistry- Theory & Practical"

### Classroom teaching style survey

In the six items below decide where you fall on a 1-5 scale with the characteristics associated with the range of scores given below that. Keep track of the total score after adding scores from each of the items. Use the total survey score to classify yourself according to the description.

1. In my classroom, my goal is to...				
1	2	3	4	5
Provide students with knowledge.		Give students knowledge, but also have them thinking about the material during class.		Have students construct their own knowledge; I am just the facilitator.
2. In my classroom, I typically...				
1	2	3	4	5
Talk for more than 95% of the class.		Talk for no more than 90% of the class.		Talk for no more than 50% of the class.
3. In my classroom, students...				
1	2	3	4	5
do no activities during class.		Will be actively doing something other than taking notes at least 10% of the class period. They will answer questions, work briefly with some material, or examine images I project. They will provide an answer to a question or problem. They will follow the directions I give them.		Will be actively doing something other than taking notes for >50% of the class project. They will be considering the process of the activity as well as getting an outcome. They may explore with an activity before I present any lecture on a topic.
4. In my classroom, students...				
1	2	3	4	5
Don't talk to each other.		Talk with each other about multiple things but at only one scale (just pairs, just small group, just whole class), or just about one thing but at multiple scales (pairs to groups to class as a whole).		Talk to each other a lot and in different combinations of students (pairs/groups/class as a whole). They debate ideas, evaluate information, reformulate material, predict, and test.
5. I ask students questions...				
1	2	3	4	5
Seeking a specific answer. Some student will answer fairly quickly or I will move on.		Orally or with clickers and I wait for one of them to answer and/or I call on different students to answer. Students should be able to answer my questions if they are learning the material.		And give them lots of time for all to think of their answer. I solicit answers from multiple students. My questions may have multiple answers, will require that they talk to each other, and ask them to explore, critique, analyze, interpret, consider alternative solutions, and develop predictions.

6. In my Class Room Students.....				
1	2	3	4	5
Seldom ask questions, but I answer them if they do.		Ask questions (plural) most every class period and I answer them, and if necessary, put the answer in the context of what we have done.		Ask questions and those questions can change the direction of the class. When they ask a question, I will have other students to suggest and discuss possible answers.

**Total Score**.....

**Name**.....

**Score 6-11:** Traditional/teacher-centered

**Score 12-15:** Transitional/teacher-guided

**Score 16-19:** Transitional/student-influenced

**Score >19:** Reformed/student-centered

### SYSTEMATIC APPROACH IN TEACHING

#### Overview

The systems approach views the entire educational program as a system of closely interrelated parts. It is an orchestrated learning pattern with all parts harmoniously integrated into the whole: the school, the teacher, the students, the objectives, the media, the materials, and assessment tools and procedures.

Such an approach integrates the older, more familiar methods and tools of instruction with the new ones such as the computer.

The focus of systematic instructional planning is the student.

It tells about the systematic approach to teaching in which the focus in the teaching is the students. Systematic Approach

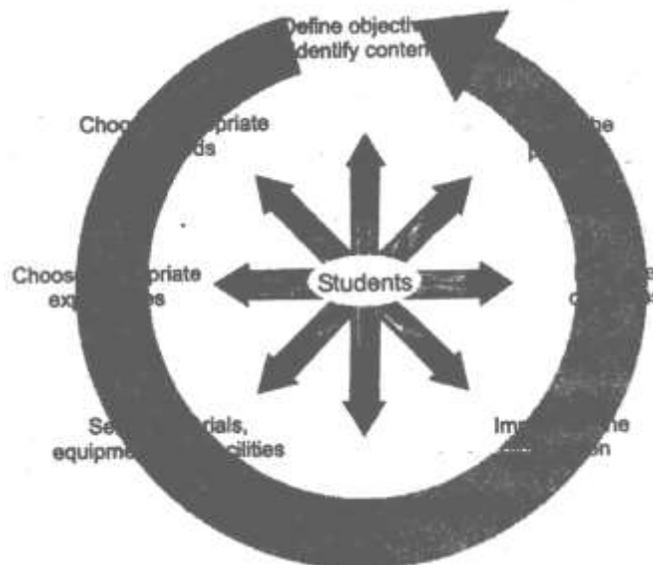
#### Objectives

1. Discuss the meaning of systematic or system's approach to teaching
2. Identify the elements of a systematic approach to teaching
3. Study the chart on systematized instruction and define the instructional objectives that consider the students' needs, interest and readiness

Design assessment tools for

#### Pretest

- A. In your small groups, study the chart on systematized instruction. Pay close attention to the parts. Write at least 4 statements on the figure.



**Figure 1.**  
**Instruction**

**Systematized**

B..Read your written chart on systematized instruction. Each one is expected to listen and statements read.

statements about the instruction. Each one is note common

### C. Analysis

#### Guide Questions for Discussion

1. Who is at the center of the chart? What does the central location in the chart mean?
2. What are the steps of the instructional process or the parts of a systematic instruction?
3. What does each step mean?
4. In what way does the chart show the systematic or systems approach to instruction? Are the elements or phases of instruction independent of one another or do they relate to one another?

### D. Test Your Understanding of a Systems Approach

Put a check mark before the item that characterizes a systems approach to instruction and an X before the item that does NOT characterize a systems approach. Get a learning partner then compare and discuss your answers. Then compare your answers with the answer key on page 202.

- 1. The function of one part can be performed by another part of the system.
- 2. One element can be substituted by another element in the system.
- 3. There is interaction among parts of the system.
- 4. Elements are independent of each other.
- 5. There is interdependence of elements.
- 6. The phases of instruction are viewed in isolation.

### Learning Focus

#### Systematic Approach to Teaching

As depicted in the chart, the focus of systematic instructional planning is the student. Instruction begins with the definition of instructional objectives that consider the students' needs, interests and readiness. On the basis of these objectives, the teacher selects the appropriate teaching methods to be used and, in turn, based on the teaching method selected, the appropriate learning experiences and appropriate materials, equipment and facilities will also be selected.

The use of learning materials\* equipment and facilities necessitates assigning the appropriate personnel to assist the teacher and defining the role of any personnel involved in the preparation, setting and returning of these learning resources. (In some school settings, there is a custodian /librarian who takes care of the learning resources and/or technician who operates the equipment while teacher facilitates.) The effective use of learning resources is dependent on the expertise of the teacher, the motivation level or responsiveness, and the involvement of the students in the learning process. With the instructional objective in mind, the teacher implements planned instruction with the use of the selected teaching method, learning activities, and learning materials with the help of other personnel whose role has been defined by the teacher.

Will the teacher use direct instruction or indirect instruction? Will he/she teach using the deductive or the inductive approach? It depends on his/her instructional objective, nature of the subject matter, readiness of students and the expertise of the teacher himself or herself.

Examples of learning activities that the teacher can choose from, depending on his/her instructional objective, nature of the lesson content, readiness of the students, are reading, writing, interviewing, reporting or doing presentation, discussing, thinking, reflecting, dramatizing, visualizing, creating judging and evaluating.

Some examples of learning resources for instructional use are textbooks, workbooks, programmed materials, computer, television programs, flat pictures, slides and transparencies, maps, charts, cartoons, posters, models, mock ups, flannel board materials, chalkboard, real objects and the like.

After instruction, teacher evaluates the outcome of instruction. From the evaluation results, teacher comes to know if the instructional objective was attained. If the instructional objective was attained, teacher proceeds to the next lesson going through the same cycle once more. If instructional objective was not attained, then teacher diagnoses what was not learned and finds out why it was not learned in order to introduce a remedial measure for improved student performance and attainment of instructional objective.

The systems approach views the entire educational program as a system of closely interrelated parts. It is an orchestrated learning pattern with all parts harmoniously integrated into the whole: the school, the teacher, the students, the objectives, the media, the materials, and assessment tools and procedures. Such an approach integrates the older, more familiar methods and tools of instruction with the new ones such as the computer.

The systems' approach to instruction is simple in theory but far from being simplistic in practice. It is not just a matter of teacher formulating his/her lesson objective and then directly teaching the student. There are a lot of elements or factors that the teacher has to take into consideration- students' needs, interests, home background, prior experiences, developmental stage, nature and the like. The teacher, in the choice of the most appropriate teaching method, learning activities, and learning resources, considers the nature of her subject matter, availability of resources, her/his capability, the developmental stage of his students, and of course his/her lesson objective. Her/his choice of assessment method for learning is likewise dependent on the lesson objective. The action the teacher takes after getting assessment results is based on the assessment results, acceptability of remedial measure to parents and students, like a tutorial class after class hours. Will an extra hour after class devoted to tutorial be acceptable to the students and parents concerned?

The phases or elements are connected to one another. If one element or one phase of the instructional process fails, the outcome which is learning is adversely affected. The attainment of the learning objective is dependent on the synergy of all elements and of all actors involved in the process.

The purpose of a system instructional design is "to ensure orderly relationships and interaction of human, technical, and environmental resources to fulfill the goals which have been established for instruction," (Brown, 1969).

### **The Phases of a Systematic Approach to Instruction.**

If we reduce the phases of a systematic approach to instruction, the phases may boil down to three. The first of the three is formulation of instructional objectives. The second is the process of instruction itself. The third phase is assessment of learning which will once more lead to the formulation of instructional objectives.

Reducing the phases of a systematic instruction to three does not reduce the complex interaction of the elements in a systematic approach to instruction. The main phases of the systematic instructional approach involves many other sub-phases. The second phase which is the instructional process itself may have two sub-phases: planning for instruction and the implementation of the instructional plan itself. Planning for instruction involves a lot of processes, too. A teacher who plans for instruction considers methods of teaching, activities and technology that are appropriate to the lesson objective, to the learners and to the nature of the lesson content. The instructional phase may begin with a review portion of past lesson followed by motivation and the lesson development which may end in an application of what was learned. This paves the way to the evaluation phase which is anchored on the stated lesson objective/s.

In short, a systematic approach to instruction is a network of elements or parts different from each other but each one is special in the sense that each performs a unique function for the life and effectiveness of the instructional system.

### **Learning Activities**

#### **Activity 1:**

Here are Instructional Design Questions (Marzano, 2007) that pertain to an effective classroom instructional design.

- What will I do to establish and communicate learning goals, track student progress, and celebrate success?
- What will I do to help students effectively interact with new knowledge?
- What will I do to help students practice and deepen their understanding of new knowledge?
- What will I do to help students generate and test hypotheses about new knowledge?
- What will I do to engage students?
- What will I do to establish or maintain classroom rules and procedures?
- What will I do to recognize and acknowledge adherence and lack of adherence to classroom rules and procedures?

- What will I do to establish and maintain effective relationships with students?
- What will I do to communicate high expectations for all students?
- What will I do to develop effective lessons organized into a cohesive unit?

1. Match these questions with the phases/ elements of a systematic instructional design given in Figure 1 on Systematized Instruction. Discuss your answers as a class.
2. Make your own graphic presentation of the systems' approach to instruction.

**Activity 2:** Accomplish this Learning Bank

Deposit (Any insight Drawn from the lesson?)	Dividends (How will 1 apply that insight?)

**Post test**

1. Review the parts of a lesson plan learned in Principle's of Teaching. Find out if the parts of a lesson plan contain the elements of a system of instruction as discussed in this Lesson. Match the parts of a lesson plan with the elements of a system's approach to instruction.

2. Does the teaching cycle contain the main elements of a systems approach to instruction?

3. What do the arrows indicated?

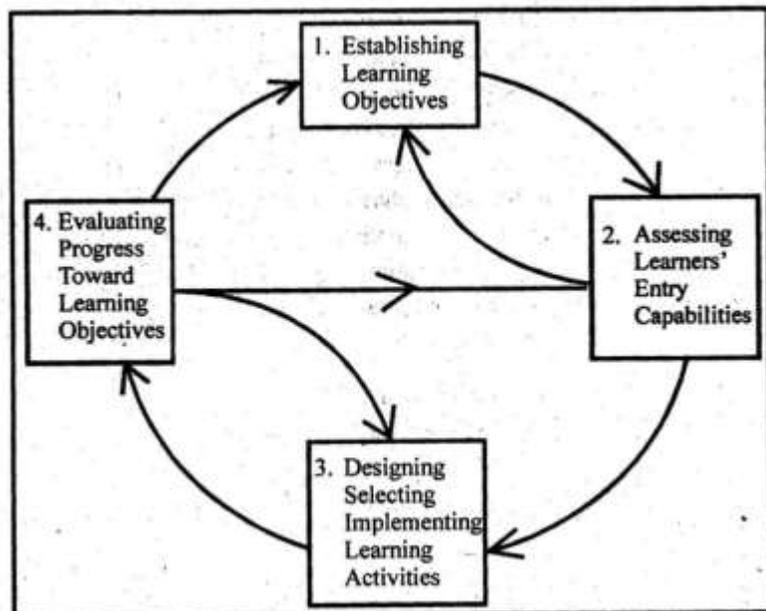


Figure 2. Model for Facilitating Pupil Learning

Source: W. Goodwin and H. Klausmefer, (1975) *Facilitating Student Learning*, New York: Harper & Row

**COACHING A REPRODUCTIVE TASK**

The situation here is where you have a learner who has to learn a task that is mainly reproductive. You have the necessary expertise and plan to adopt a 'teacher centred approach' to the coaching session. Let us apply the framework of the learning unit to this situation.

**Planning**

- Identify task

- Analyse the task
- Identify productive and reproductive elements
- Describe reproductive procedures
- Consider the working environment
- Specify objective to be achieved
- Specify performance assessment
- Consider entry behaviour of trainee
- Identify learning needs of trainee
- Consider suitable learning event
- Decide time available
- Decide sequence for learning event
- Prepare training material

### Introduction

- Gain attention/rapport
- Explain purpose/reason for learning task
- State training objective
- Explain procedure for assessment
- Check entry behaviour
- Explain participation/responsibilities for learning event
- Explain how time is to be used
- Describe task and safety/security considerations
- Describe the task within context of working environment
- Identify reproductive/productive elements
- Perform the task where possible
- Demonstrate/explain reproductive elements
- Assist trainee to practice reproductive elements
- Check performance of reproductive elements with trainee performing and explaining
- Ensure mastery of reproductive elements
- Explain productive elements
- Allow trainee to think about and practice productive elements
- Check understanding
- Practice performance of whole task
- Correct errors

### End

- Restate purpose/reason for performing task
- Restate training objective
- Invite questions
- Carry out performance assessment
- Give trainees feedback on performance
- Thank the trainee
- Provide remedial training where necessary
- Provide further opportunities for practice

### 3 Day Workshop “Systematic Approach in Teaching Chemistry – Coaching method Feedback

<p><b>PURPOSE</b> To observe a person practising a direct training skill, and to give them feedback on their performance.</p> <p><b>PROCEDURE</b> Carefully observe the learning event and record your reaction to</p>	<p><b>Method:</b> Coaching  <b>Name:</b> _____  <b>Topic:</b> _____  <b>Observer:</b> _____  <b>Date:</b> _____  <b>Start:</b> _____</p>
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<p>each item on the checklist. This can be done by marking the number that most closely matches your view, where:</p> <p>1 Indicates that this item was not done.</p> <p>2 Indicates that this item was attempted with room for improvement.</p> <p>3 Indicates that this item was accomplished.</p> <p>Alongside your reaction to each item, note any comments you consider helpful to the learner</p>	<p><b>Finish:</b> _____</p>
---	-----------------------------

ITEM CHECKLIST	REACTIONS			COMMENTS
1. Materials and equipment available and prepared.	1	2	3	
2. Gains attention/establish rapport	1	2	3	
	1	2	3	
4. State objective.	1	2	3	
5. Explain participation	1	2	3	
6. Check entry behaviour.	1	2	3	
7. Describe the task.	1	2	3	
8. Perform/demonstrate the task.	1	2	3	
9. Break task into steps for the benefit of learner	1	2	3	
10. Allow learner to practise.	1	2	3	
11. Check understanding by questioning.	1	2	3	
12. Help learner identify and correct errors	1	2	3	
13. Summary	1	2	3	
14. Assess performance/give feedback	1	2	3	
15. Thank the learner	1	2	3	

### ***PREPARING A LECTURE***

Lectures have been used since ancient times as a convenient method of communicating information to a large number of people. Lecture can become more efficient by making use of a better understanding of how people learn and by using visual aids.

A lecture gives learners specific information that is usually task & curriculum -related. The learners need the information for their work and to enable them to respond accurately to the situation they are put in during assessment. If they don't need the information there is no justification for attending the lecture. A lecture for teaching purposes should have a clear focus with a specific objective. The information you are providing should be essential to the learners' performance and, taking an extreme position, failure to learn the information will affect their performance.

The Glossary of Training Terms tells us that a lecture is:

*"A straight talk or exposition, possibly using visual or other aids, but without group participation other than through questions at the conclusion."*

### **STAGES INVOLVED IN PREPARING A LECTURE**

We list the process below which we shall follow. We recommend that you prepare the lecture by developing each of these stages in turn, although you may find that you have to go back to modify earlier stages as you work through the process.

- The Objective of a Lecture
- Entry Behaviour
- The Learning Event
- Deciding the Content
- Planning the Sequence
- Planning for Maximum Recall
- Structuring the Lecture
- Use of Visual Aids
- Performance Assessment
- Review
- Feedback

Some guidelines to bear in mind when planning is that people learn by progressing from the:

- Known to the unknown
- Simple to the complex
- Concrete to the abstract
- Observation to the theory
- General to the particular

### **LECTURE PLAN**

Name of Teacher:

Subject:

Time Available:

Learning Aids Required

Size of Group:

Objective:

Entry Behaviour:

Means of Assessment:

Guidance:

### **Planning**

- Identify topic
- Prepare a spray diagram
- Edit spray diagram to identify 'must' items
- Express must items as an objective
- Consider entry behaviour of trainees
- Consider size of group
- Decide structure to be used
- Consider visual aid hardware available
- Prepare formal visual presentation of major points
- Consider informal visual aids
- Decide when to invite questions
- Decide timing
- Decide how learning/performance is to be assessed
- Write lecture notes
- Check timing
- Check accommodation
- Check equipment

## **Introduction**

- Gain attention/rapport
- Explain purpose/reason for learning about topic
- State objective
- Link to entry behaviour
- State participation
- Outline content and structure
- State finish time

## **Development**

- Modulate voice to suit size of group
- Avoid reading lecture notes
- Use language appropriate to trainees
- Keep check of estimated timing
- Give relevant examples to support major points
- Maintain eye contact
- Present visual aids only when needed
- Avoid reading visual presentation word for word
- Assess trainee's reaction and adjust if necessary
- Assist learning by use of informal visual aids
- Check trainee's understanding where appropriate
- Where possible invite trainee's participation

## **Summary**

- Restate purpose/reason for learning about topic
- Restate objective
- Review content and major points
- Invite final questions
- Carry out performance assessment where appropriate
- Give feedback
- Close with thanks

## Distance Learning Material

### ACTIVE LEARNING

A.K. Gupta

Training Associate in Chemistry

ZIET, Bhubaneswar

In order to optimize life-long learning and potential success it is now widely accepted that young people need to have opportunities to develop personal capabilities and effective thinking skills as part of their well-rounded education.

For many teachers there is always more to do and they are always striving to find ways of doing it better – the area of effective learning and teaching is certainly no exception.

It is important that you take the time to ask yourself:

- Where are you now in terms of your learning and teaching practice?
- What is your motivation behind integrating active learning and teaching methods into your existing classroom practice?
- How can you build on your existing practice?
- What do you hope to achieve?

By using active learning methodologies, it is hoped that pupils will not only come to a deeper understanding of the issues involved, but also that their motivation and enthusiasm will be heightened. You may wish to think about the following points in order to increase pupils' motivation while adopting a teaching strategy and activity:

- Is the activity age-appropriate?
- Are pupils completely aware of the aims and objectives?
- Are there opportunities for pupils themselves to facilitate the activity?
- Will everybody have an equal chance to participate in the activity?
- Is there enough variety?

### The Role of the Teacher

There is a shift from a teacher-centred model to a learner-centred approach to learning and teaching. There is also a shift from product-driven learning to process-driven.

<b>From:</b>	<b>To:</b>
Teacher-centred classroom	Learner-centred classroom
Product-centred learning	Process-centred learning
Teacher as a 'transmitter of knowledge'	Teacher as an organiser of knowledge
Teacher as a 'doer' for children	Teachers as an 'enabler', facilitating pupils in their learning
Subject-specific focus	Holistic learning focus

These changes in the role of the teacher will inevitably result in transforming the role of pupils in the classroom.

<b>From</b>	<b>To</b>
Being passive recipients of knowledge	Active and participatory learners
Focus on answering questions	Asking questions
Being 'spoon fed'	Taking responsibility for their own learning - reflective learners
Competing with one another	Collaborating in their learning
Wanting to have their own say	Actively listening to opinions of others
Learners of individual subjects	Connecting their learning

It is very pertinent to make note of student's strengths. You may find that most students fall into more than two categories-

Intelligence Area	Is Strong in	Likes to	Learns Best Through	Famous Example	Common Misbehaviors
Verbal/Linguistic	Reading, writing, telling story, memorizing date, thinking in words	Read, write, tell stories, talk, memorize, do word puzzles	Reading, hearing, seeing words, speaking, writing; discussions	T.S. Eliot, Abraham Lincoln, Maya Angelou	Passing notes, reading during lessons
Logical/Mathematical	Math, reasoning, logic, problem solving, patterns	Solve problems, question, reason, work with numbers, experiment, use computers	Working with patterns and relationship, classifying, abstract thinking	Albert Einstein, John Dewey	Working on math or building things during lessons
Visual/Spatial	Reading, maps, charts, drawing, puzzles, imagining things, visualization	Design, draw, build, daydream, look at picture	Working with pictures and colours, visualizing, drawing	Pablo Picasso, Frank Lloyd Wright, George O'Keefe	Doodling, drawing, day dreaming
Bodily/Kinesthetic	Athletics, dancing, acting, crafts, using tools	Play sports, dance, move around, touch & talk, use body language	Touching, moving, processing, knowledge through bodily sensations	Charlie Chaplin, Michael Jordan, Martha Graham	Fidgeting, wandering around the room
Musical/Rhythmic	Singing, picking up sounds, remembering melodies, rhythms	Sing, hum, play on instrument, listen to music	Rhythm, melody, singing, listening to music & melodies	Leonard Bernstein, Wolfgang Amadeus Mozart	Tapping pencil or feet
Interpersonal/Social	Understanding people, leading, organizing, communicating, resolving conflicts,	Have friends, talk to people, join groups	Sharing, comparing, relating, interviewing, cooperating	Mohandas Gandhi, Ronald Reagan, Mother Teresa	Talking passing notes
Intrapersonal/Introspective	Understanding self, recognizing strengths, setting goals	Work alone, reflect, pursue interests	Working alone, self-paced projects, reflecting	Eleanor Roosevelt, Sigmund Freud, Thomas Merton	Conflicting with others

On the basis of research and experiences of educators it has been established that various instructional methods have varied impact on learning

5% learning takes place through LECTURE

10% learning takes place through READING

20% learning takes place through AUDIO VISUAL

30% learning takes place through DEMONSTRATION

50% learning takes place through GROUP DISCUSSION

75% learning takes place through PRACTICE BY DOING

90% learning takes place through TEACHING OTHERS/IMMEDIATE USE OF LEARNING

To ensure maximum involvement of the learners in the process of learning following may be suitably adapted –

#### Active Teaching Methods Out of School

- Surveys
- Market research
- Questionnaire design
- Observing locality
- Visits  
Institutions  
Exhibitions  
Work places  
Cultural  
Trade fairs
- Activity Centre – finding routes, looking for evidence e.g. looking for Irish signs in an area/audio taped tours
- Visual recording
  - map reading
  - Library
  - Planning trips
- Competitions
- Practical work
- Using equipment

#### Active Teaching Methods in School

- Group projects
- Questionnaires
- School library
- Collage
- Practical work
- Experimentation
- Brainstorming
- Group discussion
- Role play
- Sharing your own experiences
- Case studies
- Group work
- Tarsia Puzzle
- Cross word puzzle
- Individual students – class presentation
- Card sorting
- Video clips followed by set of questions
- Use of ICT

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Successful teaching is not a hit –or–miss proposition dependent on the right bag of tricks. There is a real “science of teaching” to guide our actions and decisions and a growing knowledge base gathered from practical wisdom of experienced teachers. We DO know various factors contributing to effective practice. We can say some practices are more effective than others in certain situations with certain students. Teaching, as other professions, relies on the judgments and commitment of its individual practitioners. Therein lies the “art of teaching”.

Dear educators, you really matter! You are the most important factor in school learning. Your teaching is a unique product- the result of your individual endeavors. Protect it, nourish it, think about it, and give it room to grow. Good teachers do not just happen; they are the product of the highest of personal motivation.

Best wishes, educators. May your ongoing journey towards professional excellence be rewarding and filled with happy times.

# DLM (Distance Learning Material)

## ASKING GOOD QUESTIONS

Ashok Kumar Gupta  
Training associate In Chemistry  
KVS, ZIET, Bhubaneswar

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Dear teachers,

Questions serve many purposes, including assessing what student already know, setting the stage for a new lesson by piquing students' curiosity, determining what factual information students have absorbed, and stimulating higher order thinking so students can apply what they have learned to new situations.

Research and experienced teachers offer these tips for asking good questions in the class room, during lecturing and during test.

**1 Yes, but why?** Ask students why an answer is correct.

**Example:** In a binary solution  $x_A + x_B = 1$ , but why?

Or 1M solution is more concentration than 1m solution but why?

Or Liquids diffuse slowly as compared to gases, but why?

Or  $N_2O$  and  $CO_2$  have same rate of diffusion under same conditions of temperature and pressure, but why?

In each of these converted questions, it is easy to tell if students know the basic information. The bonus is that these questions require the processing of the information on which the question is framed.

**2 What is the use?** Ask question that focus on the use of information.

**Example:** why do you need to know the effect of presence of nonvolatile solute on the freezing point of solution?

Such questions increase the likelihood that students will remember facts, because they apply them. An important significance of using "why" questions is that students soon begin to ask themselves as well as answer themselves.

**3 What's different now?** Asking about the implication of change is also worthwhile. To use this conversion strategy, first change something about the information you want the students to know. There are the following 8 tactics for change:

1) **Adapt-** Borrow an idea from somewhere else.

**Example:** How would our lives be different if we hibernated all along winter as animal do?  
How would our lives be different if we have no synthetic polymers/food preservatives?

2) **Modify** – make a small change for better.

**Example:** i. If the element/s do not have isotopes and isobars, what might have happened.  
ii. Give the name and atomic number of the inert gas atom in which the total number of d-electrons is equal to the difference in numbers of total p and s-electrons. [Hint: Krypton, atomic number = 36]

iii. **Statement** → **graph**;

**Example:** what type of graph will you get when PV is plotted against P at constant temperature.

3) **Substitute-** use something for something else.

**Example:** Alkyl halide,  $R-X + KCN \rightarrow R-CN + KX$ , what will happen if

i. **We substitute R-CN with Ar-X**,  $Ar-X + KCN \rightarrow ?$

ii. **We substitute KCN with AgCN**,  $R-X + AgCN \rightarrow ?$

4) **Magnify**- add, multiply or extend.

**Example 1:** Hydrogen atom has only one electron, so mutual repulsion between electrons is absent. However, in multi electron atoms mutual repulsion between the electrons is significant. How does this affect the energy of an electron in the orbitals of the same principal quantum numbers in multi electron atoms? [Hint: Ans (n+l) rule]

**Example 2:** what would be the atomic number of the next (i) alkali metal (ii) alkaline earth metal (iii) halogen and (iv) inert gas, if discovered in future?

5) **Minify**- make it smaller, omit something, divide it.

**Example:** Heat has randomizing effect on a system and temperature is the measure of average chaotic motion of particles in the system. Write the mathematical relation which relate these

three parameters. [Ans:  $\Delta S = \frac{q_{rev}}{T}$ ]

6) **Rearrange**- revise the order of the things.

**Example:** Arrange the following in order of decreasing bond angles: CH<sub>4</sub>, NH<sub>3</sub>, H<sub>2</sub>O, BF<sub>3</sub>, C<sub>2</sub>H<sub>2</sub>.

7) **Reverse**- turn things completely around.

**Example:** For the reactions  $N_2(g) + 3H_2(g) \leftrightarrow 2NH_3(g)$  at 400K, K<sub>p</sub>= 41. Find the value of the reaction  $2NH_3(g) \leftrightarrow N_2(g) + 3H_2(g)$

8) **Combine**- add to or more things together.

**Example:** Equal volume of solutions with pH =4 and pH = 10 are mixed. Calculate the pH of the resulting solution? [Ans: 7]

**4 Can you prove it?** Asking the proof of an answer requires that the student both formulate the answer and offer support for it.

**Example:** Prove that the circumference of the Bohr orbit for hydrogen atom is an integral multiple of the de Broglie wavelength associated with the electron moving around the orbit.

**5 Right, wrong or neither?** Too often, higher level questions become lower-level ones because the questioner has a predetermined answer. One way to avoid this is to consciously suspend judgment on the issue and another is to ask a question that has no right or wrong answer.

**Example:** Element: the following definitions have been given to the word ‘element’

**Element: A substance that is made of only one kind of atom.**

<input checked="" type="checkbox"/>	Is the definition correct?	<input checked="" type="checkbox"/>	Would the definition help someone to learn?
<input type="checkbox"/>	Yes, it is correct	<input type="checkbox"/>	Yes, it is helpful
<input type="checkbox"/>	No, it is wrong	<input type="checkbox"/>	No, it is not helpful
<input type="checkbox"/>	I am not sure	<input type="checkbox"/>	I am not sure

I think so because:

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**6 All of the above?** Asking questions that have more than one answer calls for careful analysis and multiple answers from the students. This strategy has wide application for teaching basic skills.

**Example:** The probability of finding electron in p<sub>x</sub> orbital is

- Zero at the nucleus
- Maximum on the two opposite sides of the nucleus along X-axis

- (c) Zero on Z-axis  
(d) Same on all sides around nucleus.

[Ans:(a, b, c)]

**7 Alike or different?** The questions like “what are the similarities between metallic and ionic crystals?” “What are the differences between metallic and ionic crystals?” use comparison and contrast- another effective strategy. A good way to introduce students to this concept is to compare and contrast concrete objects. Give small group of students, two similar objects to compare – e.g.; chlorobenzene & cyclohexylchloride. Ask them to list similarities and differences.

**8 Square peg and round hole?** Formulating questions using unusual relationships requires creativity on the part of teacher as well as the student. You could also proceed by placing any event or topic in an entirely remote context. The more the remote the association, the more effectively it will stretch your students’ thinking. The ability to break out of familiar ways of thinking is an important element in creativity.

**Example:**

Match the type of packing given in Column I with the items given in Column II

	Column I	Column II
I	Square close packing in two dimensions	Triangular voids
II	Hexagonal close packing in two dimensions	Pattern of spheres repeated in every fourth layer
III	Hexagonal close packing in three dimensions	Coordination number 4
IV	Cubic close packing in three dimensions	Pattern of spheres is repeated in alternate layer

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## Show me Board Activity

A. K. Gupta, TA (Chemistry)  
K.V.S. Z.I.E.T. Bhubaneswar

### Introduction

This technique allows students to respond to a prompt in writing and show their response immediately for the teacher to see. It allows the teacher to quickly see the level of comprehension of concepts that were just taught and keeps students engaged.

#### How to Use

##### 1. Create

Create a class set of white boards. These can be purchased individually, or for a cheaper alternative, purchase shower board from a hardware store and have the store cut the board down into the size you prefer. Another option is to put paper inside of clear sheet protectors. I use A4 sheet laminated on both sides.

Each student or student group using the whiteboard will also need a dry erase marker and something with which to erase the board. I use paper napkin for this purpose.

Option: if you glue a pom-pom to the end of the marker, students will have their own eraser, too!

##### 2. Ask

Ask students a question regarding the material just covered in the lesson. This can be an open-ended question, or possibly a multiple choice, yes/no, or true/false question. Keep in mind that they are limited to the space on the white board when writing their answer.

##### 3. Assess

Have students hold up their white boards with their answer. Scan the room to assess the students' answers.

#### When to Use

Use 'Shows me Board' activity at any point in the lesson to check for understanding.

- Multiple times during the Input portion of a lesson to ensure students are following along
- As a closing activity so that students can review what was learned in the lesson
- As a review game for an upcoming test or assessment
- At the beginning of a lesson to activate prior knowledge or to review material from a previous lesson

#### Variations

##### Be the Teacher

Students can also use white boards to teach another student about a particular concept. They can write and draw on the boards to explain a concept or to review with a partner.

##### Group Wipe Out

In groups, students must first discuss the question posed by the teacher, come to a consensus and write their answer on the white board. The first table to hold up the correct answer scores a point (table point or game point).

##### Partner Practice

Students can practice spelling words or math facts in partners with one partner giving the word or problem and the other writing it on their white board. Students can compare answers and check each others' work.

#### Additional Notes

##### Alternatives to White Boards.

If you are not able to obtain real white boards, consider using one of the following:

- plastic dinner plates
- a piece of card stock inside a sheet protector (inserts may be graph paper, templates, maps, etc.)
- laminated sheets of card stock
- student desk tops

**List of Participants**

क्र.	NAME OF PARTICIPANT	पद	के. वि. का नाम	संभाग का नाम
1	Sh. Raju Ram Meghwal	पीजीटी (रसायन)	नगांव	गुवाहाटी
2	Sh. Krishnendu Barik	पीजीटी (रसायन)	नं.1 ए एफ एस जोरहाट	गुवाहाटी
3	Sh. Sunil Kumar Rawat	पीजीटी (रसायन)	निस्ट (आर.आर.एल) जोरहाट	गुवाहाटी
4	Smt. Rajesh Ram Singh	पीजीटी (रसायन)	नारंगी	गुवाहाटी
5	Smt. Gita Kumari Thapa	पीजीटी (रसायन)	आई आई टी गुवाहाटी	गुवाहाटी
6	Sh. Amit Kumar	पीजीटी (रसायन)	न्यूबंगईगाँव	गुवाहाटी
7	Smt. Monalisa Das	पीजीटी (रसायन)	बरपेटा	गुवाहाटी
8	Sh. R. Hari Krishna	पीजीटी (रसायन)	सिलचर	सिलचर
9	Sh. Sunil Vodela	पीजीटी (रसायन)	हॅप्पीवैलि शिलांग	सिलचर
10	Sh. Govind Singh	पीजीटी (रसायन)	कुंजवन	सिलचर
11	Sh. Ankit Gupta	पीजीटी (रसायन)	आलोंग	तिनसुकिया
12	Sh. Jagdeesh Prasad Yadav	पीजीटी (रसायन)	उखरुल	तिनसुकिया
13	Smt. Manisha	पीजीटी (रसायन)	नं.3 इम्फाल	तिनसुकिया
14	Smt. Babli Barman	पीजीटी (रसायन)	डिमापुर	तिनसुकिया
15	Ms. Nupur Banerji	पीजीटी (रसायन)	तिनसुकिया	तिनसुकिया
16	Sh. Amit Kumar Gangwar	पीजीटी (रसायन)	तेजू	तिनसुकिया
17	Sh. Geetansh Sethi	पीजीटी (रसायन)	सिमडेगा	राँची
18	Sh. Chetan Singh	पीजीटी (रसायन)	गुमला	राँची
19	Sh. Brajesh Kumar	पीजीटी (रसायन)	नं.3 बोकारो	राँची
20	Sh. Ashish Kumar Singh	पीजीटी (रसायन)	पतरातू	राँची
21	Sh. Sunil Kumar	पीजीटी (रसायन)	नं.1 धनबाद	राँची
22	Sh. Prabhoo Dayal	पीजीटी (रसायन)	एनएच पी सी सिंगतम	कोलकाता
23	Sh. Robin Banerjee	पीजीटी (रसायन)	नं.1 बिन्नागुडी कैट	कोलकाता
24	Ms. Gopi Priya V.	पीजीटी (रसायन)	पानागढ़	कोलकाता
25	Sh. Sandip Dutta	पीजीटी (रसायन)	नं.2 कांचरापाडा	कोलकाता
26	Sh. Partha Maitra	पीजीटी (रसायन)	एन.टी.पी.सी.फराक्का	कोलकाता
27	Dr. Ajay Mukhopadhyay	पीजीटी (रसायन)	दुर्गापुर - सी एम ई आर आई	कोलकाता
28	Sh. Nirmalendu Kar	पीजीटी (रसायन)	नं.2 आर.एस. खड़गपुर	कोलकाता
29	Sh. Ujjal Kumar Banerjee	पीजीटी (रसायन)	फोर्टविलियम	कोलकाता
30	Sh. Anwarul Haque	पीजीटी (रसायन)	आईआई एम जोका कोलकाता	कोलकाता
31	Sh. Mukesh Kumar	पीजीटी (रसायन)	नं.1 कांचरापारा	कोलकाता
32	Sh. Sushil Kumar Singh	पीजीटी (रसायन)	हासीमारा	कोलकाता

33	Smt. Deepshikha	पीजीटी (रसायन)	गोपालपुरएम.एस. / गोपालपुर मिलिटरी स्टेशन	भुवनेश्वर
34	Smt. Smita Mohanta	पीजीटी (रसायन)	नं-1 बारिपदा	भुवनेश्वर
35	Sh. Balwinder Singh	पीजीटी (रसायन)	केन्द्रापड़ा	भुवनेश्वर
36	Sh. Debashish Sen	पीजीटी (रसायन)	नं.1 कटक	भुवनेश्वर
37	Ms. A. Meerabai	पीजीटी (रसायन)	नं-4 भुवनेश्वर	भुवनेश्वर
38	Sh. G. Parthiban	पीजीटी (रसायन)	पुरी	भुवनेश्वर
39	Sh. Suresh Kumar Sahu	पीजीटी (रसायन)	खुर्दारोड़	भुवनेश्वर
40	Ms. Gayatri Mishra	पीजीटी (रसायन)	नं.1 सम्बलपुर	भुवनेश्वर
41	Sh. Sanaka Meher	पीजीटी (रसायन)	बरगढ़	भुवनेश्वर
42	Sh. Vikas Kumar Suman	पीजीटी (रसायन)	एन.ए.डी.सुनाबेडा	भुवनेश्वर
	<b>Resource Person</b>			
43	Mr. Ashok Kumar Gupta	टी.ए. (रसायन शास्त्र)	जीटभुवनेश्वर	जीटभुवनेश्वर
44	Sh. Vishnu Verma	पीजीटी (रसायन)	नं.1 एच.ई.सी. राँची	राँची
	<b>Coordinator</b>			
45	Mr. Nabaghan Nayak	टी.ए. (गणित)	जीटभुवनेश्वर	जीटभुवनेश्वर

केंद्रीय विद्यालय संगठन, नई दिल्ली

KENDRIYA VIDYALAYA SANGATHAN, NEW DELHI

**PARTICIPANTS' FEEDBACK FOR 3 DAYS WORKSHOP ON SYSTEMATIC APPROACH IN TEACHING CHEMISTRY- THEORY & PRACTICAL (26<sup>th</sup> to 28<sup>th</sup> September 2019)**

आयोजनस्थल /VENUE : ZIET BHUABNESWAR

DATE:28.09.2019

**भाग - अ/ PART A**

PUT A ✓ TICK MARK/ आपकी सुविधा अनुसार कॉलम में ✓ ग्रेड लगाएँ

S.No.	प्रश्न / QUESTION	उत्कृष्ट	बहुत अच्छा	अच्छा	औसत	औसत से कम
		EXCELLENT	VERY GOOD	GOOD	AVERAGE	BELOW AVERAGE
1	कार्यक्रम का विषयवस्तु /CONTENT OF COURSE	18	20	04	-	-
2	निर्धारित कार्यक्रम /SCHEDULE PLANNED	18	20	04	-	-
3	किस सीमा तक कार्यक्रम से आपकी अपेक्षाएँ पूरी हुईं/EXTENT TO WHICH EXPECTATION WAS FULFILLED	13	23	05	01	-
4	दिये गए व्याख्यान/क्रियाओं की गुणवत्ता/QUALITY OF LECTURES/ACTIVITIES	21	18	02	01	-
5 (A)	QUALITY OF LECTURES BY SH. A.K.GUPTA (RP)	32	10	-	-	-
5 (B)	QUALITY OF LECTURES BY VISHNU VERMA (RP)	09	21	11	01	-
6	समूहकार्य की गुणवत्ता/QUALITY OF GROUP WORK/INTERACTION	26	15	01	-	-
7(A)	कार्यशाला के संयोजक का सहयोग/ASSISTANCE FROM COORDINATOR - N.NAYAK (TA-Maths)	16	23	03	-	-
7(B)	कार्यालय कर्मचारियों का सहयोग/ASSISTANCE FROM OFFICE STAFF	20	17	05	-	-
8	कार्यक्रम के लिए मूलभूत सुविधाओं की उपलब्धता/INFRASTRUCTURE FACILITIES AVAILABLE FOR COURSE	27	12	03	-	-
9	खान पान की गुणवत्ता /QUALITY OF FOOD	26	12	04	-	-
9	कार्यक्रम का सम्पूर्ण मूल्यांकन/OVERALL RATING OF THE COURSE	18	19	04	01	-

**भाग - ब/PART B**

a)	Name of the session / lecture which were most useful	
b)	Name of the lecture / session which were least useful	
c)	Is there any other area which was left out in the workshop? Name them if any.	

**भाग - स/PART C**

कोई अन्य सुझाव/ANY OTHER REMARKS / SUGGESTIONS

Name of the Teacher

KV:

Sign.