Block -3 unit 4

Lesson plans:- Meaning and Importance

Structure

4.1 Introduction

A lesson plan is a teacher's detailed description of the course of instruction or 'learning trajectory' for a lesson. A daily lesson plan is developed by a teacher to guide class learning. Details may vary depending on the preference of the teacher, subject being covered, and the needs of the students. There may be requirements mandated by the school system regarding the plan. A lesson plan is the teacher's guide for running the particular lesson, and it includes the goal(what the students are supposed to learn), how the goal will be reached(the method, procedure) and a way of measuring how well the goal was reached (test, worksheets, homework etc.)

4.2 Objectives

After going through this unit, you will be able to:

- Create a well organized lesson plan
- Understand the needs of the student and learning style
- Be prepared and confident while teaching in the classroom
- Help the students to achieve the aim/objective of the lesson

4.3 Why is lesson planning important?

Every teacher is required to prepare a lesson plan because this is considered as guide for the day's lessons. Lesson planning is important because it gives the teacher a concrete direction of what she/he wants to take up for the day. Research has shown that student learning is correlated to teacher planning. One major explanation is that when plan is ready, teachers can focus on its implementation. When teachers do not have to think so much about what they need to do next they are able to focus on other parts of the lesson.

Lesson planning is important because it helps teachers ensure that the day-to-day activities that go on in their classrooms are providing students with an adequate level of long –term progress toward the goals outlined in their scope and sequence, as well as their individual education plans when necessary.

An effective lesson plan includes several elements: learning objectives, quality questions, supplies and activities. It is important to have the learning objectives in mind because those should drive the development and implementation of all activities in the classroom. Quality questions are inquiries that the teacher plans to direct at the students over the course of the lesson. Sometimes these questions are rhetoric in nature, but more often they are designed to help the student think at a higher level than simple memorization and comprehension. It is important to come up with a plan for assessment to determine whether the class has met its targets.

Lesson planning is a complex yet essential part of the teaching process that changes over time as teachers gain more hands-on experience.

4.4 Need of lesson planning

FAIL TO PLAN = PLAN TO FAIL

- Through lesson planning the subject is organized properly.
- It keeps the teacher free from the faults of thoughtless teaching.
- It makes the proper atmosphere for learning process.
- The teacher also gets a clear idea about when they should start evaluation and when they should proceed to the next lesson.
- Lesson plans helps in organized teaching and saves time.
- Lesson plans allow the teacher to apply appropriate strategy.
- Teacher will be more prepared and confident while teaching the lesson.

4.5 Characteristics of good lesson planning

Learning to plan is just like any other skill. It takes time and practice. At first lesson planning may seem like a time consuming process but by creating detailed lesson plans as a beginner teacher one is able to develop routines that can become more automatic over time.

1) Lesson planning should be in a written form.
2) In lesson planning, the general and important objectives should be clearly defined.
3) The lesson plan should relate to suitable teaching method and its use.
4) A continuity component reviews and reflects on content from the previous lesson.
5) Subject, time , class, average age of the students should be mentioned in the lesson plan.
6) Important examples should be included in lesson planning.
7) Inspirational or motivational methods should be experimented in lesson planning.
8) In lesson planning, the time for each topic should appropriately be pre determined.
9) In lesson planning, the techniques and supportive materials of education like charts, maps and other audio-visual materials and its utilization should be written.

I have always realized that when you start teaching it is 90% planning and 10% management. But for an experienced teacher, it is 10% planning and 90% management. If, having developed a set of effective management skills and teaching routines, having experienced how to be resourceful with very little, and above all having learned to trust your learners, you are ready to fly on your own. It's then that you will experience the (almost) unbearable lightness of teaching.

4.6 HERBARTIAN APPROACH OF TEACHING

While Herbart emphasized only four steps, i.e. *clarity, association, system and method*, his followers modified the four steps. Thus, the five steps are termed as Herbartian five steps of teaching.

Preparation/Introduction

Some questions are asked from the pupils in order to test their previous knowledge so that curiosity may arouse in them for learning of new knowledge. By testing their previous experiences pupils are prepared for acquiring new knowledge.

Statement of aim

Here, the topic becomes clear to the pupils and the teacher himself is supposed to write the topic on black- board in clear words.

Presentation

The lesson is developed with the cooperation of the pupils. Opportunities are provided to pupils to learn themselves by stimulating their mental activity. The teacher tries to receive most of the point from the pupils by questioning so that the new knowledge may get related to the previous knowledge.

Comparison and Association

In this, the facts, events and application taught are related mutually by comparison to enable the pupils to understand the taught material. The teacher establishes a relationship between two subjects and also between the facts and events of one subject and the facts and events of other subject. The compares them so that the new knowledge may get stabilized and clarified in the minds of the pupils.

Generalization

Herbart termed this step as 'system'. After explaining the main lesson, the pupils are provided with opportunities to think. They formulate such principles and rules which may be used in various situations of the future life.

Application

In Application it is observed whether the acquired knowledge may be applied to the new situations. The teacher verifies this by asking recapitulate question or by providing opportunities to apply the acquired knowledge in the new situations. This stabilizes the new knowledge and validity of the rules may also be proved.

HERBARTIAN LESSON PLAN MODEL

Date……..

Class……

Period……

Subject……

Topic……..

1.General Objectives

These objectives are formulated by the teacher in his subject keeping in view the entering behaviors of the learners. For example: 1. to develop the knowledge of grammar among the students.

2.*Specific Objective*

These objectives are formulated on the basis of general objectives and considering the nature of the topic and level of students. These are specified in terms of knowledge, skill or appreciation. These objectives are written in behavioral terms. For Example:(i) Students will be able to recall the definition of noun. (ii) Students will be able to enumerate the examples of noun.

3.*Introduction.*

Here, the teacher employs his insight and experiences for liking new knowledge with the previous knowledge of the students. The topic is not introduced directly but it is usually emitted by the students' responses by asking introductory questions.

4.*Teaching Aids*

Audio-visual aids are selected according to the proposed topic.

5.*Previous knowledge*

Students' previous knowledge is mentioned. For example: Students are familiar with figure of speech. They know that nouns are naming words.

6.*Statement of Aim*

The teacher gives his statement of teaching topic by incorporating the students' responses. For Example: "Today, we will study about the noun and its kinds."

7.*Presentation*

The teacher prepares the developing questions after introducing the topic. The question are arranged in logical sequence, i.e., from simple to complex, considering the structure of the topic.

8.*Explanation*

The teacher is supposed to explain the answers of the given developing question. As whole of the content-matter is in the question-answer form.

9. *Black board Summary*

The teacher has to prepare the black-board summary of his teaching point and explanations.

10.*Review Questions*

The purpose of these questions is to practice the students' learning and to evaluate their performance whether they have comprehended the teaching unit or not. These review questions are asked only after rubbing the black-board summary. For example:

Q.1.What is the definition of Noun?

Q.2. Give some examples of Noun…..

11.*Home assignments*

At the end of the lesson plan, home assignment is given to the students on the same teaching unit. The purpose of home work is to practice, to organize and to study the topic for better understanding and retention.

Advantages

1.*Organized Teaching*

Each step has been organized in a logical order which provides an opportunity to the fresh teacher to become aware of future mistakes. Originality is never affected and the teaching goes on in a very organized way.

2.*Acquiring thoughts as apperception.*

Herbart believed that when the new thought related to the thoughts lying in unconscious mind of the pupils are presented, the thoughts of unconscious mind come to the conscious mind, establish relationship with the new thought and again go to the unconscious mind. Herbart termed this material process of acquiring thoughts as apperception.

3.*Use of Inductive and Deductive Methods*

While presenting the new knowledge, help of various examples is sought through generalization and rules are derived. It is an inductive method. In the step application, these

rules are to be executed, this is a deductive method. Thus, both indicative and deductive methods are used in this five steps approach.

4. *Recapitulation*

Such question is asked while recapitulating which, on answering, result in the learning and application of the acquired knowledge in new situations.

5. *Correlation Possible*

Herbart considered entire knowledge as a single unit. The knowledge of the pupils is acquired in a single unit. This allows to establishing a correlation between previous and new knowledge and between all subjects of the curriculum.

Disadvantages

1.*Mechanical Method of Teaching*

The use of these steps takes away the freedom of the teacher as he cannot incorporate his independent thought in any step. This reduces his originality. Hence, Herbartian approach is a mechanical method of teaching.

2.*No Place for Individual Differences*

While using Herbartian approach. Similar questions are asked to the entire. This overlooks individual differences.

3.*Useful in Knowledge Lesson only*

Herbartian approach is useful in the knowledge lesson only, not in appreciation and skill lessons.

4.*Teacher More Active*

In Herbartian approach, the teacher has to be more active. It is more desirable if the pupils remain more active than the teachers. As this teaching method is not activity-centered, pupils don't get any motivation for learning.

5.*No need of Generalization*

Generalization is not needed while teaching language, geography, history, music and arts etc. Thus, all the five steps are not needed while teaching.

6.*Uninteresting*

This approach stresses upon the teaching of all the subjects of curriculum in a similar sequence overlooking the interests, attitudes, abilities, and capacities of the pupils according to their mental development. The entire teaching becomes monotonous. The

pupil does not show any interest in acquiring new knowledge. Thus, Herbart‟s teaching method is not interesting

7.*Difficulty of Correlation.*

Considering the knowledge as a complete unit, Herbart emphasized correlation between different subjects for the unity in the mental life of the pupils, but following these five steps teachers impart the knowledge of different subjects to the pupils differently. They seek to establish a correlation between various subjects in order to bring integration in the mental life of the pupils which is essentially difficult, if not impossible. So, in nutshell it can be concluded that Herbartain Five-Step Approach, is an impressive and psychological teaching method. It includes both inductive and deductive methods. A correlation among all the subjects of the curriculum is possible by its use. There is a provision of recapitulation in the step under application.

However, some educationists point out that this method is useful only for knowledge lessons. Generalization is not needed in every lesson. Herbart's method is mechanical. There is no place for individual differences. It does not motivate the pupils to learn by doing. The correlation between the different subjects is essentially difficult. **Glower** points out that in Herbartian approach, emphasis is laid on teaching only instead of learning. This reduces the freedom of the teacher. Pupils also become passive. Neither is their character formed nor do they reach their desired goals. However, the pupil-teachers should follow this approach with necessary changes keeping its merits in view.

Check Your Progress

Note: a) Write your answer in the space provided after each item.

b) Compare your answers with those given at the end of the unit.

1. Write 6 characteristics of good lesson planning.

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2. Why some educationists consider "Herbart's" method is mechanical?

4.7 Prerequisite of Lesson Planning

When should we plan a lesson?

Avoid planning lessons several days or weeks ahead of time because a teacher will not be aware of the students' needs or what problems they might be faced with at that particular time. It is best to plan lessons daily and bring them into class because as the lesson is progressing (as students are interacting with their teacher and with the language they are studying) things evolve and develop, depending on what has happened and what is happening moment to moment, and this way the teacher has a better and more accurate understanding of what students need to focus on in future lessons.

Why should we plan a lesson?

Lesson planning is essential because:

- It helps the teacher conduct his/her lesson in an orderly fashion and it allows students to know what they are going to be learning and how it fits into the course syllabus.
- Students also feel that the lessons are sequenced properly. Having a good lesson plan will also increase confidence in the teacher; on the other hand, not having a plan will result in complete failure for both teacher and students. In addition, a detailed plan clearly demonstrates that the teacher has taken the time, as well as, put in the thought and effort into making the lesson.
- Teachers who do not produce a lesson plan are often lazy, or feel that they can create a lesson (known as jungle path lessons) based on what is happening in the room at that moment. This can sometimes work, but to continue to never have a lesson plan proves to be ineffective, besides, your students will become frustrated and feel a sense of negligence or carelessness on the teacher's part as well as not getting their money's worth.
- Planning detailed lessons will avoid problems in class. This will give the teacher confidence that they have done their best to plan for any eventuality, or at least minimize some problems.

It is important to note that lesson planning is a thinking process, not the filling in of a lesson plan template. Lesson plan envisaged a blue print, guide map for action, a

comprehensive chart of classroom teaching learning activities. A systematic approach for the teaching of concepts, skills and attitudes.

1) Needs, capabilities and interest of the learner should be considered.

2) Prepared on the sound psychological knowledge of the learner.

3) Provide a new learning experience; systematic but flexible.

4) Related to social and physical environment of the learner.

5) Setting objectives

The first thing a teacher does is create an objective, a statement of purpose for the whole lesson. An objective statement itself should answer what students will be able to do by the end of the lesson. **Harry Wong** states that " Each (objective) must begin with a verb that states the action to be taken to show accomplishment. The most important word to use in an assignment is a 'verb', because verb states how to demonstrate if accomplishment has taken place or not." The objective drives the whole lesson, it is the reason the lesson exist. Care should be taken when creating the objective for each day's lesson, as it will determine the activities the students engage in. The teacher also ensures that lesson plan goals are compatible with the developmental level of the students.

6) Selecting lesson plan material

A lesson plan must correlate with the text book the class uses.

7) Lesson planning and tools

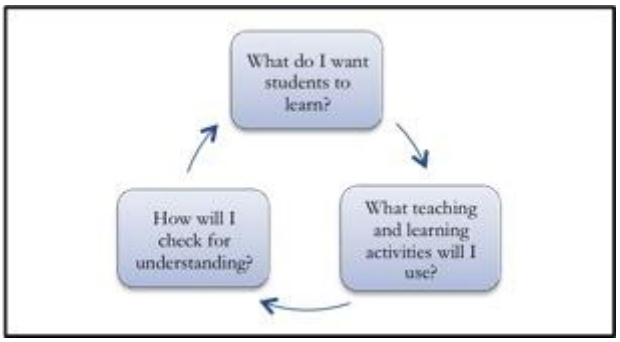
Making use of technology is an absolute best way of meeting the target of lesson plan. Teacher can use various technology like Projectors, Computer, Internet, etc. to give that interesting learning atmosphere to the students.

4.8 Strategies for effective lesson planning

A lesson plan is the instructor's road map of what students need to learn and how it will be done effectively during the class time. Before you plan your lesson, you will first need to identify the learning objectives for the class meeting. Then, you can design appropriate learning activities and develop strategies to obtain feedback on student learning. A successful lesson plan addresses and integrates these three key components:

- Objectives for student learning
- Teaching/learning activities
- Strategies to check student understanding

Specifying concrete objectives for student learning will help you determine the kinds of teaching and learning activities you will use in class, while those activities will define how you will check whether the learning objectives have been accomplished (see Fig. 1).



Steps for Preparing a Lesson Plan

Below are six steps to guide you when you create your first lesson plans. Each step is accompanied by a set of questions meant to prompt reflection and aid you in designing your teaching and learning activities.

(1) Outline learning objectives

The first step is to determine what you want students to learn and be able to do at the end of class. To help you specify your objectives for student learning, answer the following questions:

- What is the topic of the lesson?
- What do I want students to learn?
- What do I want them to understand and be able to do at the end of class?
- What do I want them to take away from this particular lesson?

Once you outline the learning objectives for the class meeting, rank them in terms of their importance. This step will prepare you for managing class time and accomplishing the more important learning objectives in case you are pressed for time. Consider the following questions:

- What are the most important concepts, ideas, or skills I want students to be able to grasp and apply?
- Why are they important?
- If I ran out of time, which ones could not be omitted?
- And conversely, which ones could I skip if pressed for time?

(2) Develop the introduction

Now that you have your learning objectives in order of their importance, design the specific activities you will use to get students to understand and apply what they have learned. Because you will have a diverse body of students with different academic and personal experiences, they may already be familiar with the topic. That is why you might start with a question or activity to gauge students' knowledge of the subject or possibly, their

preconceived notions about it. For example, you can take a simple poll: "How many of you have heard of X? Raise your hand if you have." You can also gather background information from your students prior to class by sending students an electronic survey or asking them to write comments on index cards. This additional information can help shape your introduction, learning activities, etc. When you have an idea of the students' familiarity with the topic, you will also have a sense of what to focus on.

Develop a creative introduction to the topic to stimulate interest and encourage thinking. You can use a variety of approaches to engage students (e.g., personal anecdote, historical event, thought-provoking dilemma, real-world example, short video clip, practical application, probing question, etc.). Consider the following questions when planning your introduction:

- How will I check whether students know anything about the topic or have any preconceived notions about it?
- What are some commonly held ideas (or possibly misconceptions) about this topic that students might be familiar with or might espouse?
- What will I do to introduce the topic?

(3) Plan the specific learning activities (the main body of the lesson)

Prepare several different ways of explaining the material (real-life examples, analogies, visuals, etc.) to catch the attention of more students and appeal to different learning styles. As you plan your examples and activities, estimate how much time you will spend on each. Build in time for extended explanation or discussion, but also be prepared to move on quickly to different applications or problems, and to identify strategies that check for understanding. These questions would help you design the learning activities you will use:

- What will I do to explain the topic?
- What will I do to illustrate the topic in a different way?
- How can I engage students in the topic?
- What are some relevant real-life examples, analogies, or situations that can help students understand the topic?
- What will students need to do to help them understand the topic better?

(4) Plan to check for understanding

Now that you have explained the topic and illustrated it with different examples, you need to check for student understanding – how will you know that students are learning? Think about specific questions you can ask students in order to check for understanding, write them down, and then paraphrase them so that you are prepared to ask the questions in different ways. Try to predict the answers your questions will generate. Decide on whether you want students to respond orally or in writing. You can also ask yourself these questions:

- What questions will I ask students to check for understanding?
- What will I have students do to demonstrate that they are following?
- Going back to my list of learning objectives, what activity can I have students do to check whether each of those has been accomplished?

An important strategy that will also help you with time management is to anticipate students' questions. When planning your lesson, decide what kinds of questions will be productive for discussion and what questions might sidetrack the class. Think about and decide on the balance between covering content (accomplishing your learning objectives) and ensuring that students understand.

(5) Develop a conclusion and a preview

Go over the material covered in class by summarizing the main points of the lesson. You can do this in a number of ways: you can state the main points yourself ("Today we talked about…"), you can ask a student to help you summarize them, or you can even ask all students to write down on a piece of paper what they think were the main points of the lesson. You can review the students' answers to gauge their understanding of the topic and then explain anything unclear the following class. Conclude the lesson not only by summarizing the main points, but also by previewing the next lesson. How does the topic relate to the one that's coming? This preview will spur students' interest and help them connect the different ideas within a larger context.

(6) Create a realistic timeline

How easy it is to run out of time and not cover all of the many points they had planned to cover. A list of ten learning objectives is not realistic, so narrow down your list to the two or three key concepts, ideas, or skills you want students to learn. Instructors also agree that they often need to adjust their lesson plan during class depending on what the students need. Your list of prioritized learning objectives will help you make decisions on the spot and adjust your lesson plan as needed. Having additional examples or alternative activities will also allow you to be flexible. A realistic timeline will reflect your flexibility and readiness to adapt to the specific classroom environment. Here are some strategies for creating a realistic timeline:

- Estimate how much time each of the activities will take, then plan some extra time for each
- When you prepare your lesson plan, next to each activity indicate how much time you expect it will take
- Plan a few minutes at the end of class to answer any remaining questions and to sum up key points
- Plan an extra activity or discussion question in case you have time left
- Be flexible – be ready to adjust your lesson plan to students' needs and focus on what seems to be more productive rather than sticking to your original plan

Presenting the Lesson Plan

Letting your students know what they will be learning and doing in class will help keep them more engaged and on track. You can share your lesson plan by writing a brief agenda on the board or telling students explicitly what they will be learning and doing in class. You can outline on the board or on a handout the learning objectives for the class. Providing a meaningful organization of the class time can help students not only remember better, but also follow your presentation and understand the rationale behind in-class activities. Having a clearly visible agenda (e.g., on the board) will also help you and students stay on track.

Reflecting on Your Lesson Plan

A lesson plan may not work as well as you had expected due to a number of extraneous circumstances. You should not get discouraged – it happens to even the most experienced teachers! Take a few minutes after each class to reflect on what worked well and why, and what you could have done differently. Identifying successful and less successful organization of class time and activities would make it easier to adjust to the contingencies of the classroom. For additional feedback on planning and managing class time, you can use the following resources: student feedback, peer observation, viewing a videotape of your teaching, and consultation with a staff member.

Conclusion

To be effective, the lesson plan does not have to be an exhaustive document that describes each and every possible classroom scenario. Nor does it have to anticipate each and every student's response or question. Instead, it should provide you with a general outline of your teaching goals, learning objectives, and means to accomplish them. It is a reminder of what you want to do and how you want to do it. A productive lesson is not one in which everything goes exactly as planned, but one in which both students and instructor learn from each other.

4.9 Preparation of lesson planning

Following points should be kept in mind while preparing a lesson plan:

1) Lesson number

2) Date

3) Time

4) Class

5) Subject

6) Average age of children

7) Topic of the lesson

8) Aims of the lesson

   a) Specific aim

   b) General aim

9) Material aids

10) Previous knowledge

11) Introduction

12) Statement of the aim

13) Presentation

14) Comprehensive question

15) Black-board summary

16) Application or Recapitulation

17) Home-work

Topic of the lesson

For effective teaching the reading material is divided into various topics. If a topic is small in size, then it works as a lesson for the day. But if it is lengthy, then it is divided into sub topics, according to our ideas and accordingly each heading is also determined.

Aims of the lesson

Before lesson is taught, it is necessary to decide its aim or objectives. Every lesson has following two types of aims:

a) **General aims**: By general aims we mean aims related to the subject. In these aims, no change is made as they are definite and have direct relation with the full subject.

b) Specific aims: Those aims which are not related to the full subject, instead, they are related toa part of the lesson and with a particular context. These are changed in accordance with the changes in lesson and context.

Material aids

In order to make the teaching successful, effective and interesting, a teacher uses material aids or devices and techniques. The time and manner of which should be included in the lesson plan.

Previous knowledge

Previous knowledge is the knowledge, which the students already possess before teaching them a new lesson. In previous knowledge not only the previous reading material, but all the experiences of the child, which he has achieved till now is included. By taking into

consideration the previous knowledge, this will also be kept in mind, but previous knowledge of the students should be in accordance to the selected lesson.

Introduction

Before starting a new lesson, a teacher should prepare his students to acquire new knowledge. Here a question arises, how can a teacher may ask 3 or 4 questions based on the students' previous knowledge, in order to inculcate interest, enthusiasm and curiosity among his students for accepting the new lesson. In order to make the student accept and adopt a new lesson, following methods can be used:

a) Asking questions based on the lesson

b) Narrating a story

c) Showing a picture

d) Explaining the subject

e) Narrating poems

g) Presenting any example or incident etc.

Statement of aim

After completing the introduction of the lesson, students get a picture of the objectives of that lesson. After giving the introduction, teacher should tell the specific aims. While students are acquainted with the specific aims of lesson, enthusiasm is generated among them. Secondly, they choose the correct way for the study of the lesson. Their attention is centralized towards the reading subject and the teacher will feel comfortable while teaching.

Presentation

After statement of aim, when the attention of both, the teacher and the students are centralized towards the lesson, the teacher should use the principle of selection and division. For the development of the units, a teacher is required to use various educational techniques like questions, examples, explanation, narration and exhibition.

Comprehensive questions

Comprehensive questions are those questions, which are asked by the teacher from his students after teaching every unit of the lesson, in order to ascertain, whether the children have properly understood the lesson or not. Comprehensive questions are usually of two types – first related to the teaching matter and second related to the language.

Black – board summary

The black board summary should always be formed with the help of students, but not much time should be devoted to this purpose. Black –board summary consists of important sentences which should be small, clear, relevant and written in a serial form so that students can adopt lesson matter easily and comfortably.

Recapitulation

Recapitulation exercise should be done so that whatever has been taught to the students till now, can be retain in their brains. The teacher comes to know about the success or failure in achieving his aim.

Home – work

Home assignment should be given to the students related to that lesson.

Check Your Progress

Note: a) Write your answer in the space provided after each item.

b) Compare your answers with those given at the end of the unit.

3. When should we plan a lesson?

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4. Why material aids are useful in teaching?

4.10 Samples of lesson plan

Lesson Plan 1

Date : …… Class : VII A

Subject : English (Grammar) Period : II

School : ……. Duration : 40 mins

Topic : Adjective

General Objective:

1. To make the students acquainted with the rules of English grammar.
2. To enable the students to use grammar rules practically.
3. To enable the students to speak and write correct English.
4. To develop their interest and confidence in English language.

Specific Objectives:

1. To expose the students the use of adjectives and its various kinds.
2. To give them practice of adjective through exercise.

Previous Knowledge:

The students are familiar with the parts of speech.

Material Aids:

Ordinary classroom equipments, Charts and pictures.

Statement of the aim:

Well students, today we shall learn about 'Adjective.'

Teaching Point	Teaching Objective	Pupil-Teacher Activity	Students' Activity	Black-board work/Material Aids	Evaluation
Developing grammar	To expose the students the use of adjectives and its	Q. What is this? Q. Which part of speech does	Ans. Sir, this is a doll. Ans. Sir, the doll represent	A picture	To develop the students the use of adjectives and its

	various kinds	a doll represent? Q. What is the colour of her dress? Q. What does the word 'red' represent?	noun. Ans. Sir, the colour of her dress is red. Ans. No response.		various kinds.
Developing grammar	There was a brown bird. Rahul is healthy boy. Green parrot was flying in the sky.	1. What is 'bird' in grammar? 2. What is the colour of the bird? 3. What is 'boy' in grammar? 4. What type of boy he is? 5.What is 'parrot' in grammar? 6. What is the colour of the parrot?	1. The 'bird' is noun in grammar. 2. The colour of the bird is brown. 3. The 'boy' is noun in grammar. 4. He is a healthy boy. 5. The parrot is noun in grammar. 6. The colour of parrot is green.	Adjective is a word used with a noun to add something to its meaning.	Fill in the blanks: 1.
Home Work		Define Adjectives with proper examples.	Students will write on their note-books.		

Lesson Plan 2

Date: …… Class: VI

Subject: English Period: III

School: …… Duration: 40 mins.

Topic : Sohrab and Rustam(Prose)

General Objective:

1. To make the students to speak and write correct English.

2. To enable the students to read the lesson with correct pronunciation.

3. To develop the vocabulary of the students.

4. To develop the writing ability in students.

Specific Objectives:

1. To enable the students to understand the story 'Sohrab and Rustam'.

2. To enable the students to understand the ideas, expressed in the passages of the lesson.

Previous Knowledge:

The students are familiar with stories of warriors.

Material Aids:

Ordinary classroom equipments, Charts and pictures.

Statement of the aim:

Today we shall study about the lesson "Sohrab and Rustum". It is the story of two great warriors Sohrab and Rustum. Rustum was the father of Sohrab.

Teaching point	Teaching objective	Teacher's activities	Students' activities	Material aids	Evaluation
Development of speaking skills	Students speak in simple English	Q. What is this? Q. What is this? Q. What is this? Q. What do you know about the lesson 'Sohrab and Rustum'?	Ans. Sir, this is a sword. Ans. Sir, this is a spear. Ans. Sir, this is a shield. Ans. Sir, warriors use it. No response	Pictures and charts	To develop pre knowledge and proceed simple to complex
Development of reading skill	Students read the passage correctly	Rustum was …… Teacher reads the passage with correct pronunciation			

		Now teacher listens to the students	Students read the passage one by one		
Development of pronunciation skill	Students are now able to pronounce the words correctly	**Pronunciation drills:** Teacher pronounces some difficult words as: Warrior Beautiful Palace Princess	Students pronounce these words with the teacher	Black board	Pronounce these words: Worried Married Happily Please
	Students are now able to read the passage accurately	**Silent reading:** Teacher remain silent during the silent reading	Students read the passage		Fill in the blanks
Home work		1. Who was Rustum? 2. What was the name of his wife? 3. Where did they live?	Students will write on their note-books.		

Lesson Plan 3

Date: ……. Class: VIII

Subject: English Period: Ist

School: …….. Time: 40 mins.

Topic: The Ferryman (Poetry)

General Objective:

1. To enable the students to enjoy the beauty of the poem.
2. To enable the students to appreciate poetry.
3. To develop the imagination of the students.

4. To enable the students to enjoy the rhythm and style of the poem.

5. To enable the students to understand the thoughts contained in the poetry.

Specific Objectives:

1. To enable the students to enjoy the beauty of the poem 'The Ferryman'.

2. To enable the students to appreciate the rhythm and style of the poem.

3. To enable the students to understand the ideas, expressed in the poem.

Previous Knowledge:

Students have already learnt the similar poems.

Material Aids:

Ordinary classroom equipments, Charts and pictures.

Statement of the aim:

Well students, today we shall recite an interesting poem 'The Ferryman'.

Teaching point	Teaching objective	Teacher's activities	Students' activities	Method and Material aids	Evaluation
		Introductory Questions: Q. What are the means of travelling? Q. What are the means of voyage? Q. What is called the man who rows the boat? Q. What is the synonym of boatman?	Ans. Bus, car, train etc. are the means of travelling. Ans. Boat, ship etc. are the means of voyage. Ans. The man who rows the boat is called boatman. No response	Question and answer method Pictures	

Development of reading skill	The students read the poem with rhythm	The teacher reads the poem with rhythm and gesture	The students hear attentively	Reading method	
Improvement in pronunciation and development in word sound	The students know the pronunciation of the words and tell the words of same sound	**Pronunciation drill:** The teacher writes down a few words on the board and pronounce the same correctly. Then he ask the students to pronounce the words	The student pronounce the words	Direct method	Pronounce the word of same sound
Testing of rhythm and pronunciation	The students read the poem with correct rhythm and proper pronunciation	**Imitation reading:** The teacher ask the students to read the poem with proper rhythm and pronunciation	The students read the poem		
Comprehending vocabulary	The students tell the meaning of the following words as Devices, Ferryman etc.	The teacher writes the meanings and tough words			
Explanation of the poem		Teacher explains the poem	The students will listen carefully		
Reading aloud by the teacher		Once again the teacher will give a model reading of a	The students will listen to the teacher carefully		

		stanza			
Comprehension questions		Q.1. What is the meaning of this line "And my eyes are blue"	Ans. 1. The child wants to impress the boatman through the beauty of his eyes. It is blue.		
Home work		Learn the poem with rhythm	Students will write on their note-books.		

4.11 Let us sum up

In this unit we have discussed the need of lesson planning. We have discussed the Herbartian approach of teaching. Lesson planning is very essential as it helps the teacher conduct his/her lesson in an orderly fashion and it allows students to know what they are going to be learning and how it fits into the course syllabus. It will help pupil teacher to plan his lesson in orderly manner. The samples may help the teacher to construct the lesson plan and also exploring more opportunities for integration of alternative resources in your classroom.

4.12 Questions for reflection

- Does the lesson plan fit a particular framework?
- What are the benefits of lesson planning.
- Why should we plan a lesson?
- What might a detailed lesson plan look like?
- In your opinion what should be included in a lesson plan. Discuss.

4.13 Answers to check your progress

1. 1) Lesson planning should be in a written form.

2) In lesson planning, the general and important objectives should be clearly defined.

3) The lesson plan should relate to suitable teaching method and its use.

4) A continuity component reviews and reflects on content from the previous lesson.

5) Subject, time , class, average age of the students should be mentioned in the lesson plan.

6) Important examples should be included in lesson planning.

2. Some educationists point out that this method is useful only for knowledge lessons. Generalization is not needed in every lesson. Herbart's method is mechanical. There is no place for individual differences. It does not motivate the pupils to learn by doing. **Glower** points out that in Herbartian approach, emphasis is laid on teaching only instead of learning. This reduces the freedom of the teacher. Pupils also become passive.

3. Avoid planning lessons several days or weeks ahead of time because a teacher will not be aware of the students' needs or what problems they might be faced with at that particular time. It is best to plan lessons daily and bring them into class because as the lesson is progressing things evolve and develop, depending on what has happened and what is happening moment to moment, and this way the teacher has a better and more accurate understanding of what students need to focus on in future lessons.

4. In order to make the teaching successful, effective and interesting, a teacher uses material aids or devices and techniques.

4.14 Reference and suggested reading

- Kaur Manmeet: English Lesson Plan(IGNOU help book for English lesson plan in English)
- Lesson Plan Steps (Herbartian Approach). Retrieved from http://freenaleen.blogspot.in/2013/12/lesson-plan-steps-herbartian-approach.html
- Serdyukov, Peter, and Ryan, Mark. *Writing Effective Lesson Plans: The 5-Star Approach.* Boston: Allyn & Bacon, 2008.
- Unit Plans for Teacher. Retrieved from http://www.education.com/reference/article/unit-plans-teachers/

UNIT 2 UNIT AND LESSON PLANNING

Structure

2.1 INTRODUCTION

You would agree that success of any activity depends largely upon its planning. Proper planning of activities leads to fruitful results. The same is true with teaching as well. As a teacher you are given charge of a certain class to teach mathematics. So you have to cover the given course in the available time span and also ensure effective learning amongst children. Now the challenge is to do it successfully. This very idea may generate thinking with regard to sequencing, ordering, arranging and grouping the items of the curriculum, matching these with the available time slot and identifying suitable activities to be performed with children etc. This is nothing but planning for teaching.

You may plan teaching in various ways. Firstly you may develop a rough layout for the whole year in which you may decide before and how much time you would devote to various topics or units in the curriculum. Secondly you may like to develop a detailed planning of the separate units of work where in you may decide the number of lessons for each segment of work along with the method or approach to deal with them. Thirdly you may like to go into details of activities pertaining to each lesson. So the planning for teaching involves the process of making decisions about why, how and what to teach which may range from one lesson to the whole curriculum for the year. In this unit we will discuss the various aspects of unit and lesson planning in mathematics.

2.2 OBJECTIVES

After going through this unit, you will be able to :

- recognize the need and Importance of unit and lesson planning;
- list various steps involved in unit planning;

- develop a unit plan for teaching of a given unit;
- enlist various steps of lesson planning; and
- develop lesson plans for teaching lessons in mathematics.

2.3 UNIT PLANNING

The curriculum of mathematics may be available to you in terms of either content/ concepts or competencies. Your target would, therefore, be to ensure acquisition of certain understanding and skills among children with regard to dealing with mathematical content and processes. In other words you may intend to develop mathematical competencies amongst children under your charge. You may recall that in the document titled, "Minimum Levels of Learning at Primary Stage" (Ministry of Human Resource Development report published by the NCERT, 1991) the necessary competencies have been listed under five major areas of mathematical learning. Further classwise arrangement of competencies is also available within each area. Since there would be a long list of competencies/ prescribed for each class unit planning may be of great help to you in guiding your actions leading to success. The following sub-sections cover the meaning of unit planning, need and importance of unit planning and the process of developing the unit plans.

2.3.1 Meaning of Unit Planning

Let us first understand what do we mean by a unit in mathematics. A unit in mathematics comprises of a chunk of interlinked competencies/concepts/content which have some common basis or characteristics. So, within any area of mathematical learning several units can be formed. It is the nature of competencies content and the experience of the teacher about teaching mathematics and his/ her perception of learning styles of children which will enable him/her to decide about formulating the units.

Now you will appreciate that teacher has to organize the given set of competencies/ content prescribed for the given class in a meaningful manner which will make his/her teaching and evaluation systematic and convenient. A unit in mathematics may be covered in one day, several days or even several weeks. You will have to decide the number of lessons to be delivered under one unit.

Having arranged the mathematical competencies in a graded manner and divided them into units for purposes of classroom transaction, you would like to think of the ways of communicating the same to the children. This will obviously make you think of the sequence of lessons within a unit, the method of teaching instructional aids, students' activities and the evaluation procedures. This decision if presented in an organized manner, would result into a unit plan.

2.3.2 Need and Importance of Unit Planning

You may like to ask why we need a unit plan or can't we do without a unit plan? The answer is simple that unit planning may bring about significant changes in the quality of teaching-learning. The following points highlight the advantages of unit planning and thus clarify how unit planning makes teachers talk easier and effective:

- It helps teachers to have a holistic view of teaching-learning, which may help in organizing time and resources available at his/her disposal.
- It helps in designing a systematic, sequential and graded arrangement of course content which may give insight to develop teaching activities in the best possible manner.

- It helps in giving a balanced emphasis to various aspects of course content or competency under reference.
- It provides an opportunity to correlate textual content with the competencies to be dealt with in the class.
- It may help thinking about alternative approaches to teaching-learning and adapt to individual differences.
- It may help unit-wise evaluation of children and in organizing remedial teaching and undertaking enrichment measures as per the requirements.

2.3.3 Steps Involved in Unit Planning

Unit planning involves two major processes, namely, sequencing and selection. The main focus of unit planning should be to ensure effective learning on the part of children. After arranging the given set of competencies/content into a teaching-learning sequence, a unit can be formed on the basis of identification of meaningful segments of competencies/content which may also be viewed in terms of time available for teaching-learning. Some people divide the course content to be covered month-wise and call them 'units'. Still more important is the nature of course content or competencies and, as such, some units may be small and some big in terms of time taken for teaching them. So a teacher has to apply judgment. Since we can not leave the whole thing on intuitive ways of formulating units, some steps to be followed are suggested below:

a) Estimate the whole course content/set of competencies for the class during the year.

b) Estimate the teaching time available to the teachers.

c) Arrange the given course content /set of competencies in a teaching-learning sequence.

d) Identify inter-linked aspects of course content /competencies.

e) Distribute the whole course content/competencies into units. Hence you may like to consider the following:

   i) A unit should not be too small or too lengthy.

   ii) It should have some element of commonness within its components.

   iii) It should be such that it should not require more than a month in any case to complete in the class, and

   iv) It should be such that its completion develops a sense of accomplishment to both the teacher and the students.

f) For each listed unit, further breaking up of teaching lessons would be required.

g) For each lesson within the unit, decide about the appropriate teaching methods, teaching aids, students activities and the evaluation procedure.

h) Present these decisions and the break-up in a tabular form which may be considered to be unit plan.

2.3.4 Development of Unit Plan

Development of unit plan may be attempted differently by different people. But the development of competency among children should be the main point to be kept in mind while developing a unit plan. One way of looking at unit planning could be to do it area wise the number of competencies listed in each area for a class which are to be taught in about ten months duration. So theoretically speaking,

there should be at least five units, each concentrating on one of the areas. But it will not be a practical way of doing things since there may be a large number of competencies in an area. So further break-up would be necessary. Although it should not be taken as the norm but for practical reasons there should not be more than 10 competencies in an area and it should not be planned to be taught in more than 20 working days. The similarity in the nature of content involved in competencies identified for a unit should also be given due consideration. Now various lessons may be planned within a unit and points related to organization of teaching-learning may be drawn as suggested. The following example of a unit plan may give you an idea of the format and particulars of a unit plan :

UNIT PLAN

Unit Plan No..... Name of the Teacher.....

Subject - Mathematics

Area - 1 (understanding whole numbers and numerals)

Competencies Covered: 1.3.1 (Recognition and writing of numerals from 100 to 1000.)

1.3.2 (Writing of number names from 1 to 100.)

S. No.	Competency	Lesson No.	Method of Teaching	Teaching aids	Students Activies	Evaluation
1.	1.3.1. (a) Recognizes numerals from 100 to 999	1 to 3	Play way method and demonstration	Flash cards	Various games and group work	Oral testing
	(b) Recognizes numeral 1000	3	–do–	–do–	–do–	–do–
	(c) Writes numerals from 100 to 1000	4	–do–	–do–	Individual and group activities	Oral as well as written
2.	1.3.2 Writing of number names from 1 to 1000	5 and 6	–do–	–do–	–do–	Oral and written test

2.3.5 Limitations of Unit Planning

While unit planning is of much value to teachers it may suffer from the limitations mentioned below:

- It is sometimes difficult to clearly anticipate the teaching-learning approach in advance.
- The division of content / competencies is artificial.
- It gives a piecemeal view of the competencies developed during a year.
- I requires a conscious effort on the part of a teacher. A less experienced teacher sometimes find it difficult to plan units.
- It puts a check to the flexibility of the teacher when followed rigidly.

Check Your Progress

Notes: a) Write your answers in the space given below.

b) Compare your answer with the one given at the end of this unit.

1. What is a Unit Plan?

.....

.....

.....

2 State briefly how unit planning is helpful to teachers.

.....

.....

.....

3. Mention two limitations of unit planning.

.....

.....

2.4 LESSON PLANNING

According to G.H. Green, the teacher who has planned his/her lesson wisely, related to his/her topic and to his classroom without any anxiety is ready to embark with confidence upon a job s/he understands and is prepared to carry it to a workable conclusion. S/he has foreseen the difficulties that are likely to arise and prepared her/himself to deal with them. S/he knows the aims that her/his lesson is intended to fulfill and s/he has identified her/his own resources for the purpose. And because s/he is free of anxiety, s/he will be able to estimate the value of her/his work as the lesson proceeds, equally aware of failure and success and prepared to learn from both. The following paragraphs have been devoted to the meaning, need and importance of lesson planning and the process of developing lesson plans.

A proper planning of the lesson is the key to effective teaching. The teacher must know in advance the subject matter and the mode of its delivery in the classroom. This gives the teacher an idea of how to develop the key concepts and how to correlate them to real-life situations and how to conclude the lesson. Lesson planning is also essential because effective learning takes place only if the subject matter is presented in an integrated and correlated manner and is related to the pupil's environment. Though lesson planning requires hard work it is rewarding too. It conceives a lesson as 'Plan of Action' implemented by the teacher in the classroom.

2.4.1 Meaning of Lesson Planning

A lesson plan outlines in detail the various steps which the teacher proposes to undertake in his/ her class. As such, a lesson plan concerns itself with the teaching of one period. Planning for a lesson means identification of the sequence and style of presentation and evaluation procedure to be adopted for classroom teaching of a lesson. Hence it is a proposition in advance which establishes a linkage between the why, what and how of teaching in one period. While attempting to do this the teacher may foresee likely problems in classroom communication and may arrange certain materials and decide about techniques to be adopted to ensure a smooth and effective teaching-learning situation. Thus a lesson plan is a means of taking advance decisions about the selection, sequencing and execution of various activities to be performed in a classroom with a view to ensuring learning of children.

2.4.2 Need and Importance of Lesson Planning

When you go for teaching a lesson in the classroom, usually you get prepared for it, though informally. But sometimes you find that you are not able to teach the entire content which you prepared or on the other hand, the content to be covered is not sufficient for full period. Sometime, you may get stuck-up while teaching and so get nervous. May be that you are not aware of the objectives of teaching a lesson and so did not bother about its attainment. How to overcome all such problems? This can be done through systematic lesson planning. You get a chance of thinking about all these problems in advance while planning your lesson and deciding about taking corrective steps for possible hurdles. The process of developing a lesson plan is such that these problems get tackled automatically.

Lesson planning helps the teacher in the following ways:

- It makes teaching systematic and well organized.
- It helps teachers in identifying adequate content and its proper sequencing for teaching a lesson.
- It helps teachers to learn to foresee and tackle learning difficulties of children.
- It enables teachers to utilize the available time properly.
- It helps in developing insights about learning needs and abilities of children.
- It helps teachers to develop the habit of undertaking immediate corrective measures.
- It gives confidence to teachers during teaching.

2.4.3 Steps of Lesson Planning

While developing a lesson plan, first of all you have to decide about the objectives of teaching that particular lesson. The objectives will be both general as well as specific. In order to achieve the objectives, some subject matter or content is required. This content is to be selected as per the competence with reference to the specific objectives of the lesson as well as the previous knowledge of the learner. So the content has to be local specific, interesting and related to the previous knowledge of the learner. Another important aspect of lesson planning is to detail out the method to be used for transacting the required material to the learners. The choice of method will depend on the nature of the content, the class/grade as well as the ability of the learners. While specifying the method of delivery, the teachers' activities as well as the learners' activities are to be specified along with the evaluation exercises/questions. The evaluation has to be based on the material transacted in the classroom and the competency aimed to be developed. At the primary stage, the evaluation questions have to be very simple, keeping in view the learners' physical and mental growth.

The following issues need to be decided for developing a lesson plan.

1. **Objectives:** The objectives of teaching a particular lesson should be stated as per the competency to be developed amongst children. Generally teachers state only general and specific objectives of the lesson.
2. **Content:** The subject matter that is intended to be covered should be limited to the prescribed time. The matter must be interesting and it should be related to the pupils' previous knowledge. It should also be related to daily life situations.
3. **Methods:** The most appropriate method be chosen by the teacher. The method selected, should be suitable to the subject matter to be taught. Suitable teaching aids must also be identified by the teacher. The teacher may also use supplementary aids to make his/her lesson more effective.

4. **Evaluation:** A teacher must evaluate his/her lesson to find the extent to which he/she has achieved the objectives of his/her lesson. Evaluation can be done even by recapitulation of subject matter through suitable questions.

2.4.4 Methods of Lesson Planning

A lesson may be planned in various ways. Several methods have, therefore, been evolved. The most commonly used method is the Herbertian method. The steps followed in Herbertian method of lesson planning are:

1. Introduction
2. Presentation
3. Association (or comparison)
4. Generalization
5. Application
6. Recapitulation, and
7. Home assignment / home work

1. Introduction

It pertains to preparing and motivating children to the lesson content by linking it to the previous knowledge of the student, by arousing the curiosity of the children and by making an appeal to their senses. This prepares the child's mind to receive new knowledge. This step, though so important, must be brief. It may involve testing of previous knowledge of the child. Sometimes the curiosity of pupil can be aroused by some experiment, chart, model study or even by some useful discussion.

2. Presentation

It involves stating the object of the lesson and exposure of students to new information. The actual lesson begins and both teacher and students participate. A teacher should make use of different teaching aids to make this lesson effective. She/He should draw as much as is possible from the students making use of judicious questions. In mathematics lessons It is desirable that a heuristic atmosphere prevails in the class.

3. Association

It is always desirable that new ideas or knowledge be associated to the daily life situations by citing suitable examples and by drawing comparisons with the related concepts. This step is all the more important when we are establishing principles or generalizing definitions.

4. Generalization

In mathematics lessons generally the learning material problem leads to certain generalizations which then lead to the establishment of certain formulae, solving problems, principles and laws. An effort should be made that the students draw the conclusions themselves. A teacher should guide the students only if their generalization is either incomplete or irrelevant.

5. Application

In this step of a lesson plan the knowledge gained is applied to certain situations. This step is in conformity with the general desire of the students to make use of generalization in order to see for themselves if the generalizations are valid in certain situations or not. This is used for assessing the effectiveness of the lesson by asking students questions on the contents of the lesson.

6. Recapitulation

Recapitulation can be done by giving a short objective type test/problem solving method to the class.

One important point to remember is that the steps given above for lesson planning are formal Herbertian steps and teacher should not try to follow these very rigidly. These are only guide-lines and in many lessons it is not possible to follow all these steps. So this method should be followed to the extent possible.

2.4.5 Features of a Good Lesson Plan

1. Through lesson planning the teacher will be able to pinpoint for himself the objectives of teaching that particular lesson. The objectives should be such that they are : (a) attainable during a span of one period only. (b) in sequence with the objectives already attained by the learners.
2. The teacher will discover whether the subject matter is adequate enough to be transacted during the period.
3. He will identify, in advance, the activities to be carried out by the learners.
4. He will be able to anticipate the expected answers of the learners.
5. A good lesson plan should present good linkage between the objectives, teacher and student activities, on the one hand and the method, the teaching aid and the evaluation items on the other.
6. The plan should neither be too short nor too long.
7. It should focus on specific piece of content so as to attain the competency in hand.
8. The activities planned should be quite interesting to the young learners.
9. It should focus on the development of a clear understanding among children instead of rote memorization.

2.4.6 Development of a Lesson Plan

Keeping in view the steps of lesson planning and the methods discussed in the preceding sections, lesson plans may be developed. The following examples will demonstrate some approaches to lesson planning. You may learn to develop lesson plans by adapting these to the competency in hand and the anticipated teaching-learning situation.

LESSON PLAN - 1

Name of School : XYZ		Date: 10/8/2002
Class	: III	
Subject	: Mathematics	Period: II
Topic	: Place value of 3 digit numbers	Competency: Students state the place value of the digits within a 3 digit numeral.
General objectives of the lesson	:	To develop understanding of the place value of the digits in numerals.
Specific objectives of the lesson	:	Students will be able to state place value of the digits within a 3 digit numeral.
Teaching/Instructional material	:	• ordinary classroom material.

- spike abacus.
- a chart showing 3 digit numbers marked as units, tens and hundreds.
- flash card containing 3 digit numbers.

Previous knowledge : i) Students recognize and write numbers 1 to 1000

ii) Students state the place value of digits in a 2 digit number.

iii) Students write number names of 3 digit numbers.

Introduction

Teacher will put some questions to the students:
(Writing a few two digit numbers on the blackboard.)

1. What are the numbers written on the blackboard?

   24, 40, 39

2. In 24, which number represents units?
3. In 24, which number represents tens?
4. What is the place value of numeral 4 in 24.
5. What is the place value of numeral 2 in 24?
   (Teacher may ask similar questions for the numerals 40 and 39.)
6. What is the place value of 2 in 246.
   (Writing number 246 on the blackboard.) (No answer)

Statement of aim: Children, today we will study the place value of numerals in a 3 digit numbers.

Teacher-Pupil Activity

(Showing the flash card containing 3 digit numbers.)

1. What numeral is shown on the flash card ?
2. Write the number name for this number (246)

   (Two Hundred Forty Six)

   (Covering the numeral 2)
3. What is the numeral left now?

   (Forty Six)

   (Showing the flash card again)
4. What numeral is there on the third place from right side?

   (2)

   (Asking to compare the numerals by reading their number names 246 and 46.)
5. What additional you had to say for 246 as compared to 46?

(So you have to say two hundred because of the numerals 2's placement at 3rd place from the right. Hence the place value of 2 in 246 is 200.)

Teacher will now take 3-4 examples of 3 digit numbers and get the place value chart filled in with the involvement of students.

3 digit Numerals	Place values					
	Hundreds		Tens		Units	
	Numeral	Place Value	Numeral	Place Value	Numeral	Place Value
246	2	200	4	40	6	6
759	7	700	5	50	9	9
483	4	400	8	80	3	3
908	9	900	0	00	8	8

The chart will be further discussed using flash cards if children find it difficult. Another explanatory chart can be developed through students involvement as under:

3 digit Numerals	Place value								
	3rd place from right			2nd place from right			1st place from right		
	Numeral	Place	Place value	Numeral	Place	Place value	Numeral	Place	Place value
785	7	Hundred	7×100=700	8	Tens	8×10=80	5	Unit	5×1=5
462	4	Hundred	4×100=400	6	Tens	6×10=60	2	Unit	2×1=2
407	4	Hundred	4×100=400	0	Tens	0×10=00	7	Unit	7×1=7
370	3	Hundred	3×100=300	7	Tens	7×10=70	0	Unit	0×1=0

Generalization

Teacher to assist children in generalizing, on the basis of above examples, the following:

i) Place value of the digit in 1st place from right side is the number represented by the digit itself.

ii) Place value of the digit in 2nd place from right side is the digit multiplied by 10.

iii) Place value of the digit in 3rd place from right side is the digit multiplied by 100.

iv) The place value of the digit in a numeral increases ten times as we move from right to left.

Place value of 2 in 12 is 2 × 1

in 24 is 2 × 10

in 247 is 2 × 100

Recapitulation

1. What is the place value of 3 in 138?

   (30)

2. What is the place value of 3 in 13?

   (3)

3. What is the place value of 3 in 347?

   (300)

4. State the place values of numerals in 754.

Numeral	Place value
7	700
5	50
4	4

Home Work

State the place values of the digits in the following 3 digit numerals 393, 408, 790, 456.

LESSON PLAN – 2

Name of School: XYZ — Date: 10/1/98

Class: V — Duration: 40 Minutes

Subject: Mathematics — Period: Third

Topic: Volume of cuboid

Competency: Students compute the volume of a cuboid.

General objective of the lesson: To develop the thinking and reasoning powers of the students.

Specific objectives:
i) Students understand the concept of volume.
ii) Students find the formula of the volume of cuboid.
iii) Students apply the formula of the volume of cuboid to relevant problems.

Teaching/Instructional Material

1. Ordinary classroom materials
2. One dm cube of wood or any solid material
3. A chart showing diagrams of square and rectangle
4. Two cuboids with different dimensions
5. A tin of cuboidal shape
6. A graduated cylinder
7. One centimeter cube piece of some solid

Previous Knowledge

The students know the concept of areas of square and rectangle.

Introduction

To test their previous knowledge and to prepare them for the new lessons, the following questions will be put to them:

1. (By showing the diagram of a square in the chart)
   How do you calculate the area of this diagram?
2. (By showing the diagram of a rectangle)
   How will you calculate the area of this diagram?
3. (By showing the tin)
   If you have to say that this tin can contain so much oil, how can you express?
4. Similarly, if you want to say that a tank can contain so much of water, how can you express?
5. What is the space of a tin or a tank?
6. (By showing the cuboid)
   How would you name this solid?
7. How will you find out the space or volume of this cuboid?

Statement of the Aim

The student will not be able to answer the last question and the teacher will announce. "Today we shall find out the method of calculating the volume of a cuboid". The aim will be simultaneously written on the blackboard.

Presentation

Teacher - Pupil Activity	
1. By showing the 1 cm. cube. (Long, broad and thick)	1. What are the dimensions of the solid? 2. What is its shape? 3. What is the difference between a cube and a cuboid ? Pupil- Teacher Statements: "It is known as a cube. The cube has all the three dimensions uniform, whereas in the cuboid these may be different." 4. What is the volume of this cube? Pupil-Teacher Statement: "Let us measure it with the help of a graduated cylinder" The initial reading of the water level will be taken and then the solid will be immersed. The water will rise by one cubic centimetre.
By showing the 1 cm. cube	5. What are the dimensions of this cube? Ans.: Length = 1 cm Breadth = 1 cm Thickness or Height = 1 cm 6. What is the volume of this cube? Ans. : It is one cubic centimetre (One cubic centimeter is taken as the units of volume).

By showing the cuboid of soap

7. What are the dimensions of this cuboid?
   Ans: Length = 5 cm
   Breadth = 3 cm
   Thickness or Height = 2 cm
8. In how many parts have its length, breadth and thickness respectively been divided?
   Ans.: i) The length is divided into 5 parts.
   ii) The breadth is divided into 3 parts.
   iii) The thickness is divided into 2 parts.
   (The teacher will promptly cut this cuboid alongwith lines of division. It will result into 30 parts.).....(i)
9. What is the shape of each small part?
   Ans.: It is cube.
10. What is the dimensions of this small cube?
    Ans.: Length = 1 cm
    Breadth = 1 cm
    Thickness = 1 cm
11. What is the volume of this small cube?
    Ans.: It is one cubic cm
    This cube will be compared with the cuboid already shown to the students.
12. What is the volume of the whole cuboid?
    Ans. : The volume of the cuobid = 30 cubic cm.....(ii)

By showing the second cuboid of soap

13. What are the dimensions of the cuboid?
    Ans.: Length = 6 cm
    Breadth = 4cm
    Thickness or Height = 2 cm
    (Similarly it will result in 48 small parts)..... (iii)
14. What is the volume of one small cube?
    Ans.: It is one cubic cm.
15. How many such cubes are there in all?
    Ans.: There are 48 such cubes.
16. What is the volume of the whole cuboid?
    Ans.: The volume of the cuboid is 48 cubic cm ..... (iv)

Generalization

For the purpose of generalization, the teacher will draw the student's attention to the parts (i), (ii), (iii) and (iv) and will ask them to observe these to find out some relationship between the dimensions and the volumes of cuboids.

1.	What are the dimensions in the first case?	Length = 5 cm Breadth = 3 cm Height or thickness = 2 cm
2.	What is the volume in this case?	Volume = 30 cubic cm.
3.	What are the dimensions in the second case?	Length = 6 cm Breadth = 4 cm Height or Thickness = 2 cm
4.	What is the volume in this case?	Volume = 48 cubic cm.
5.	What is the relation between the volume and dimensions?	Volume is the product of these three dimensions.

Dimension of Cuboid			Volume of Cuboid
Length	Breadth	Height	
5 cm	3 cm	2 cm	5 × 3 × 2 = 30 cu.cm
6 cm	4 cm	2 cm	6 × 4 × 2 = 48 cu.cm
L	B	H	L × B × H

There Volume of Cuboid = Length × Breadth × Height or Thickness or L × B × H or T.

Blackboard Summary

1. The cuboid has all the three dimensions:
   a) Length
   b) Breadth
   c) Height or Thickness
2. Volume of a cuboid
   = Length × Length × Height or Thickness

Relation

1. What is the use of finding out the volume of air in a room?

Ans : While sitting in a room the person should get a regular supply of fresh air. The minimum essential volume of air should be available to everybody. With the help of total volume of air in a room, a classroom or a hall, we can fix its comfortable seating capacity. If we try to accommodate more than this fixed number, this will be uncomfortable and suffocating for every body.

Recapitulation

1. What do you mean by volume?
2. What is the difference between a cube and a cuboid?
3. What is the formula for the volume of a cuboid?
4. What is the need of finding out volume in different cases?

Home Work

1. What is the volume of air in your classroom, if its dimensions are as follows:
   a) Length = 5 Metres
   b) Breadth = 4 Metres
   c) Height = 3.5 Metres

2. Find the volume of water in a tank if its dimensions are as follows:

   a) Length = 350 cm.

   b) Breadth = 200 cm.

   c) Depth = 100 cm.

The examples given above will help you develop insights into the process and procedure of lesson planning. You may plan your activities in a variety of ways wherein children should be able to learn things in an interesting manner.

2.4.7 Limitations of Lesson Planning

You would have seen that lesson planning provides an opportunity to the teacher to think in advance about the sequence of likely classroom events and anticipate the possible problems and sort them out before the actual delivery of the lesson. Yet lesson planning has its own limitations. A few are mentioned below:

- It makes teaching organized but rigid.
- If followed strictly, it leaves no room for innovativeness on the part of the teacher.
- Too much of emphasis on it may make things routinized.
- It is good for beginner teachers. Experienced teachers usually have little faith in structured classroom behaviours.
- It is difficult to anticipate all possible kinds of classroom situations in advance and therefore lesson plans lack relevance.

The above mentioned limitations however, do not suggest that lesson planning is of no value. The only caution reflected through the above statements is that it should be developed carefully and experience counts for much. It may be noted that detailed lesson planning may be practiced in the beginning and brief lesson planning should serve as an indispensable tool in the hands of a teacher throughout his/her career as a teacher.

Check Your Progress

Notes: a) Write your answers in the space given below.

b) Compare your answer with the one given at the end of this unit.

4. What is a Lesson Plan?

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5. Mention three ways in which lesson planning helps the teachers.

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6. Mention two limitations of lesson planning.

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2.5 LET US SUM UP

After going through the preceding sections you would be able to appreciate the need and importance of unit and lesson planning and also the methodology of developing unit and lesson plans. Unit and Lesson Plans do help teachers in organizing their actions in advance and help them undertake teaching in an interesting and efficient manner. If planned properly, unit and lesson plans may lead to better quality of learning amongst children. It is, therefore, important for every teacher to develop a habit of unit and lesson planning and keep doing it throughout his/her teaching career. Greater details may be required in the beginning while brief plans may be followed there after.

2.6 UNIT-END EXERCISES

1. Explain the difference between a unit and a lesson plan.
2. List the important steps of unit planning.
3. List the important steps of lesson planning.
4. Discuss the advantage and limitations of lesson planning.

ANSWERS TO CHECK YOUR PROGRESS

1. A unit plan is the statement of proposed decisions taken about teaching-learning and evaluation of a segment of inter-linked content/competencies.
2. • systematic and balanced way of teaching various concepts,
   • evaluating pupils progress, and
   • the proper management of time and resources.
3. i) The division of content /competencies is artificial.
   ii) It may put a check on flexibility of teachers if followed rigidly.
4. Lesson plan is a detailed statement of proposed actions with regard to classroom activity particularly the selection, sequencing and execution of activities to be performed during a period to ensure learning amongst children.
5. i) It helps teachers to identify the relevant content and its sequencing.
   ii) It helps teachers to foresee the learning difficulties of children.
   iii) It helps to develop confidence amongst teachers.
6. i) It brings rigidity in teaching-learning.
   ii) It leaves no room for teacher's innovativeness

UNIT 13 STANDARDIZED ACHIEVEMENT TESTS

Structure

13.1 INTRODUCTION

In the field of education, interdependence of teaching, learning and testing is recognised. The first step in the teaching-learning process is defining and determining the objectives of learning and the outcomes to be expected from classroom instruction. In the light of these processes, the main reliance is placed on tests which are constructed by teachers. Through these tests you can see as to how well your students have mastered the unit of instruction. But when we want to compare achievement of an individual with a group, class and school or study the student growth over a period of time to know whether the progress is more or less rapid than might be expected, standardized tests are used. Both the standardized and the teacher-made tests are important. So you are expected to know the list of achievement tests made in the country and abroad. In this unit, we discuss as to why traditionally students have been labeled as underachievers or overachievers on the basis of their academic achievement. You will also learn that as to when and how the achievement tests should be used.

13.2 OBJECTIVES

After going through this unit, you should be able to:

- discuss the concept of a standardized achievement test,
- describe as to how standardized tests could be used,
- differentiate between standardized and teacher-made tests,
- compile a list of available achievement tests batteries, and
- differentiate between achievement tests and aptitude tests.

13.3 STANDARDIZED ACHIEVEMENT TESTS

Achievement tests are generally classified as standardized tests and teacher-made tests. Normally in schools teacher-made tests are used. The teacher-made achievement tests assess student achievement in relation to instruction provided in a school. Standardized tests are constructed by test construction specialists, usually with the assistance of curriculum experts, teachers, and school administrators for the purpose of determining a student's level of performance relative to the performance of other students of similar age and grade. These tests often take long time to construct. These tests are called standardized because they are administered and scored according to specific and uniform procedures. In other words, a standardized test administered and scored in a school would be administered and scored in exactly the same manner as anywhere else in the country.

When standardized tests are employed, test results from different students, classes, schools and districts can be more easily and confidently compared than would be the case with teacher-made tests. Imagine the difficulty in comparing teacher-made tests results from Ms. Sharma's class in New Delhi with Ms. Sundram's class in Chennai. Not only would the test items be different the length of the test, the amount of time allowed, the instructions given by the teachers and the scoring criteria would also be different. In short, there would be little or no basis for comparison. The value of standardized test lies particularly in situations in which comparisons can be made; comparisons of one school with other schools, comparison of achievement in different areas by a student or by a school or comparison of achievement with the potentiality for achievement indicated by an aptitude test. The norms provided with standardized tests make such comparisons as school achievement, readily possible with national norms. Age or grade level in different subjects can be compared. Age or grade level on an achievement test may be compared with age or grade level on a measure of scholastic aptitude.

The distinctive features of a standardized test represent important advantages for some purposes and disadvantages for others. Basing the test upon a careful analysis of the common objectives expressed in textbooks, courses of study, and report of committees of professional bodies should guarantee that the thinking of many specialists has entered into the test plan. However, a published test is fixed for a period of years in terms of broad and common objectives. It is not a flexible tool. It cannot be adapted to special current needs, to local emphasis/conditions; or to particular limited units of study.

13.3.1 Functions of Standardized and Teacher-made Tests

In the light of differences between standardized and teacher-made tests, more emphasis is laid on teacher-made tests when we want to:

- test how well students have mastered a unit of instruction,
- determine the extent to which distinctive objectives have been achieved, and
- provide a basis for assigning course marks.

Standardized test should be used when we wish to:

- compare achievement with potentiality for an individual or a group,
- compare achievement of different skills or subject areas,
- make comparisons between different classes and schools, and
- study student's growth over a period of time to see whether progress is appropriate as expected.

13.3.2 Standardized Tests vs. Teacher-made Tests

Standardized achievement tests differ from the tests that you prepare for your own class. The broad differences are as follows:

i) A standardized test is based on the general content and objectives common to many schools in the country whereas a teacher-made test can be adapted to content and objective(s) taught in classroom.

ii) A standardized test deals with large segments of knowledge or skill, whereas a teacher-made test can be prepared in relation to any specific/limited topic.

iii) A standardized test is developed with the help of professional writers, reviewers and editors of test items whereas a teacher-made test usually relies upon the skill of one or two teachers.

iv) Quality of items in a standardized test is high. They are pretested and selected on the basis of difficulty level and discriminating power. Quality of test items is often unknown in a teacher-made test and is typically lower than that of a standardized test.

v) Reliability of a standardized test is usually high. Reliability of teacher-made test is usually unknown but can be high if test items are carefully constructed.

vi) In standardized test the administration and scoring procedures are standardized and specific instructions for its administration are given. In teacher-made test uniform procedure of administration is possible, but is usually flexible.

vii) Interpretation of scores of a standardized test can be compared to norm-groups. Test manuals and other guides aid interpretation and use. In a teacher-made test comparisons and interpretations of scores are limited to local class or school situation.

13.3.3 Uses of Standardized Achievement Tests

Standardized tests are used for comparative purposes. These are quite different from the main uses of teacher-made tests which are to determine student's mastery or skill levels, to assign grades, and to provide students and parents with feedback. Now, a question arises as to why the classroom teacher administers a standardized test? May be to compare the performance of students of the current year with the performance of students of the previous year or to compare class A with class B. But the most appropriate answer is more likely that the classroom teacher administers standardized tests because he/she is required to do so. This is the case in many, if not most of the schools

in the country. Part of the reason for this is the current trend toward increasing accountability which includes evaluation of various state funded programmes. Most, if not all, such programmes require that standardized achievement tests be administered as part of the programme evaluation and further funding may depend on the results of these tests. By doing so we would be able to compare students, schools and districts with each other in order to make judgements concerning the effectiveness of programmes across the schools, districts or states. As long as this objective remains, use of standardized tests will be necessary part of teaching. Hence, you should learn to administer and interpret the results of standardized tests which are sometimes used for evaluating the general educational development of students in the basic skills. They are also used for evaluating student progress during the year or over a period of years and for grouping the students for instructional purposes. These tests can also be used for diagnosing relative strengths and weaknesses of students in terms of broad subject or skill areas.

Check Your Progress 1

Notes: a) Write your answers in the space given below.

b) Compare your answers with those given at the end of the unit.

1. Write two differences between standardized tests and teacher-made tests.

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2. List three uses of standardized tests.

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13.4 ADMINISTERING AND INTERPRETING STANDARDIZED TESTS

To ensure that the standardized tests are able to serve the specific purpose, we should know the procedure of administering and interpreting standardized tests.

13:4.1 Administering Standardized Tests

The best way to guard against any error in the test administration is to instruct everyone to administer the test as per the directions given in the test. Sometimes, classroom teachers individualize the test administration by helping slower students or pushing faster students. This is a violation of standardized testing procedure. The test and its administration and scoring are called 'standardized' because everyone gets the same treatment. Therefore we should follow the requirements of every standardized test:

The following are some of the do's and don'ts about administering standardized tests.

Do's

- Read the manual before test administration.
- Be sure you have been given the correct form for your grade level.
- Adhere strictly to the administration instructions.

Don'ts

- Try to minimize the achievement nature of test.
- Deviate from the standardized administration instructions (i.e. do not allow more time, give hints, spell words, define words, etc.).

13.4.2 Types of Scores / Norms for Interpretation

In this sub-section, we shall consider the types of scores offered for standardized tests: grade norms or equivalents, age norms, percentile and standard scores. For example, on a language ability test, if a student aged 15 years scores 76 on the total test score, what can we say about this student? We have the following information in the test manual:

90 to 100	:	Fluency in language
80 to 90	:	Command over language
70 to 80	:	Working knowledge of language
below 70	:	Low language competency

These details will help us in having an assessment of the 15 year old student. These details are also available for other age groups. So there is a need for expressing test performance in a form other than the actual score. Let us elaborate this point for the sake of clarity.

Grade norms/equivalents: Grade norms are probably most widely used to report test results. The representative behaviour is presented on yearly basis at the beginning of the grade/class and the average performance during the year can be calculated. These are likely to be most often misinterpreted. Let us consider the following example:

Anil, student of IV grade, obtained a Mathematics computation grade equivalent score of 7.6 (seventh grade, sixth month) on the CAT (California Ability Test) that means even though he is only in fourth grade, he can do seventh-grade level Mathematics. Do you agree with this statement? If you do, you have fallen victim to the most common kind of misinterpretation regarding these grade norms. Anil's score is the score that the publisher estimates would be obtained by seventh grader during six month. It does not mean that he is ready for seventh grade Mathematics. All we know for sure is that a fourth grader who obtains Mathematics grade equivalent to 7.6 is well above average in Mathematics. So grade norms or equivalents have limitations for (i) extreme ability groups, and (ii) may not be equal due to different school programmes or motivational levels.

Age norms equivalents: Age-equivalent scores are very similar to the grade-equivalent scores. Age-equivalent scores are determined in a fashion similar to that described for grade equivalents. Age norms are based on the average scores earned by students at different age levels and are interpreted in terms of age equivalents. That is, samples of 7-, 8-, and 9-years old might be tested and average scores for each age determined. Scores for younger or older students would then be estimated or extrapolated from these scores. Problems similar to those affecting grade equivalents affect age equivalents also. Main problems are as follows:

- Equal differences in scores may not reflect equal differences in achievement. In other words, does growth from age 6 to age 7 present the same amount of growth as that from age 10 to age 11? It may or may not, depending on the trait being measured. Furthermore, growth in most traits slows down or stops during the teens or early twenties. In other words, a year's growth in reading after age 17 is likely to be very different from a year's growth in reading at age 7.
- Age equivalents are only meaningful if subjects are taught across all grades. It makes little sense to say that someone has an age equivalent of 16.9 in subtraction.
- Age equivalents may be misinterpreted as standards, rather than averages or norms.
- Growth across subjects may vary greatly, even if age equivalents show equal growth. A year's increase in language age equivalent does not necessarily mean the same thing as a year's increase in science age equivalent.

Unlike grade equivalents, age equivalents have not attracted widespread acceptance in the schools. Like grade equivalents, they are most useful in the elementary grades to compare growth across a common core of subjects. The above mentioned shortcomings should always be considered in interpreting age equivalents.

Percentile ranks: With grade and age-equivalent scores we indicate the grade or age group in which a student's test performance would be considered average. That is, if a student obtains a grade-equivalent score of 4.5, we can say the student did as well on the test as an average fourth-grader during the fifth month of school. At times, however, we may not be interested in making such comparisons. In fact, we are more interested in determining as to how a student's performance compares with that of students in his or her own grade or of the same age. Percentile ranks enable us to make such comparisons.

Percentile ranks are a substantial improvement over grade and age-equivalent scores in that they do not suffer from the many limitations of the latter. Since comparisons are within grade, it does not matter whether subjects are taught across grades, and since growth is only relative to others in the grade, the problem of growth being unequal at different grade levels is avoided. In addition, percentile ranks are less likely to be considered as standards for performance. However, percentile ranks do have two major shortcomings which are listed below:

i) Percentile ranks are often confused with percentage correct. In using percentile ranks, be sure you are communicating that a percentile rank of 62, for example, is understood to mean that this individual's score was higher than 62 percent of the people who took the test or, conversely, that 62 percent of those taking the test received scores lower than this individual. Commonly, a score at the sixty-second percentile is misinterpreted to mean the student answered only 62 percent of the items correctly. A score at the sixty-second percentile might be equivalent to a B or a C whereas a score of 62 percent would likely be an F.

ii) Equal differences between percentile ranks do not necessarily indicate equal differences in achievement. In a class of 100 students, the difference in achievement between the second percentile and fifth percentile is substantial, whereas the difference between the forty-seventh and fiftieth is negligible assuming a normal distribution. Interpretation of percentile ranks has to consider that units toward the tails of the distribution tend to be spread out while units toward the center tend to be compressed as illustrated in Figure 13.1.

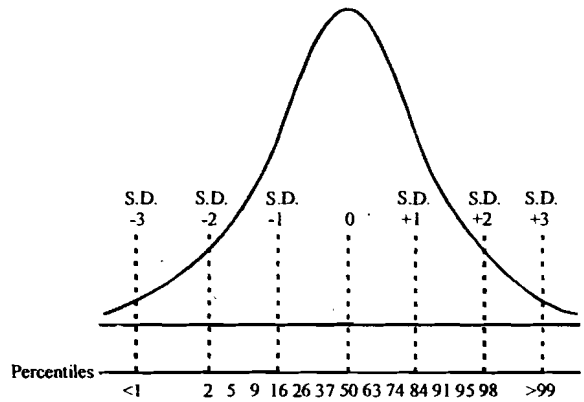

Fig.13.1: Normal Curve (Approximate Percentile Ranks Indicated Along Baseline)

Standard scores: Like percentile ranks, standard scores compare a student's performance to that of other students at the same grade level. The problem of equal differences between units not representing equal differences in achievement is overcome through the use of standard scores. You will recall that the z-score is the basic type of standard score, and all other standard scores are derived from it. This is an important consideration to keep in mind since many test publishers **create** new types of standard scores with various means and standard deviations when they publish new tests (e.g., Developmental Standard Scores on the Iowa Tests of Basic Skills, or Expanded Standard Scores on the Comprehensive Tests of Basic Skills). You need not be overwhelmed by such scores since conceptually they are identical to z-scores.

Though different from z-scores, there are a special type of standard scores called stanines. Stanines are ranges or bands within which fixed percentages of scores fall. They are determined by dividing the normal curve into nine

portions, each being one-half standard deviation wide. Stanines and the percentage of cases within each stanine are indicated below:

Stanine	*Percentage of cases*
1	4% (lowest)
2	7%
3	12%
4	17%
5	20%
6	17%
7	12%
8	7%
9	4% (highest)

Stanines have a mean equal to 5 and a standard deviation equal to 2. Each stanine is one-half standard deviation wide. Interpreting stanines is straight forward in that a student is simply described as being "in" the second stanine, ninth stanine, etc. A major advantage of stanines is that, since they are intervals or bands, they tend to minimize over interpretation of data. Also, since they only require single digit number, they are useful for situations where recording space is limited.

Standard scores represent the ultimate in standardized test score interpretation. However, there is one factor that limits their widespread adoption – most educators, parents, and students do not understand how to use standard scores. As a result, few schools or districts request standard scores from test publishers. However, standard scores save time and effort in determining aptitude-achievement discrepancies. They also allow for easy comparison of scores both within and across students either over time or across subjects.

You may keep in mind that such scores are not understood by most parents and students and as a result may not be a convincing way to use standardized test results in reporting them. What should you use, then? In our opinion, grade and age equivalents lend themselves too easily to misinterpretation and have too many limitations. As mentioned, standard scores would be our choice but may be too complicated for use by the general public. We therefore, recommend that you use percentile ranks when reporting and interpreting standardized test results to parents. Be sure, however, to consider the limitations we mentioned regarding percentile ranks in making such interpretations.

Check Your Progress 2

Notes: a) Write your answer in the space given below.

b) Compare your answer with that given at the end of the unit.

1. Which of the norms are recommended for interpreting standardized test results to public?

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13.5 STANDARDIZED ACHIEVEMENT TEST BATTERIES

The first standardized test came into existence around the turn of the 20th century. These tests were tests of a single achievement area such as spelling. Single subject achievement tests are still used although they are largely confined to the secondary grades.

A variation of the single subject achievement test is the diagnostic achievement test. However, use of the diagnostic test is normally limited to those elementary and secondary school students who experience academic difficulty. These tests are administered to "diagnose" or indicate the specific cause or causes of a problem (for example, faulty letter identification) in some general academic area (for example, reading recognition). Seldom are such tests administered to an entire class or grade. Typically, students are selected for diagnostic testing after a single subject test or an achievement battery has indicated a problem in some general academic area.

The most frequently used type of achievement test is the achievement test battery, or survey battery. Such batteries are widely used, often beginning in the first grade and administered each year thereafter. There are several reasons why survey batteries are more popular than single subject achievement tests. The major advantages of survey batteries over single subject achievement tests are as follows:

- Each subtest is coordinated with every other subtest, resulting in common administration and scoring procedures, common format, and minimal redundancy.
- Batteries are less expensive and less time consuming to administer than several single subject tests.
- Each subtest is normed on the same sample, making comparisons across subtests, both within and between individuals, easier and more valid.

This last point is probably the major reason as to why batteries have come into such widespread use. We often use standardized tests to compare students, classes or schools. It takes less time to make these comparisons when a single norm group is involved than when several are involved. Furthermore, the likelihood of clerical errors is minimized when single, comprehensive score reports from a battery are used to make comparisons, as opposed to several single subject score reports.

Following are the disadvantages of batteries:

- The correspondence (content validity) of various subtests in the battery may not be uniformly high.
- The battery, emphasizing breadth of coverage, may not sample achievement areas in as much depth as a single subject achievement test.

13.5.1 Achievement Test Batteries or Survey Batteries

Various achievement test batteries are available to teachers these days. Some of the important batteries are discussed in this section:

California Achievement Test (CAT): This battery is published by CTB / McGraw Hill. It has five levels appropriate for various grades, and two alternate forms of the test are available. Scores are provided for reading (vocabulary and comprehension) language (mechanics, usage, structure and spelling) and Mathematics (computation, concepts and problems). The CAT has been standardized simultaneously with the Short Form Test of Academic Aptitude, facilitating identification of aptitude achievement discrepancies.

Comprehensive Tests of Basic Skills (CTBS): Like the CAT, the CTBS is published by CTB/McGraw-Hill. However, it is appropriate for students in grades K-12. Seven levels of the test are available for students in the various grades. An alternate form can be obtained. Level A is considered a pre instructional or readiness test and provides scores for letter forms, letter names, and Mathematics. Level B provides scores for reading, language, Mathematics and Total Battery. Level B is designed to be administered to students who have completed their first year of instruction. The remaining levels, C, 1, 2, 3, and 4, yield scores in reading, language, Mathematics, reference skills (except for Level C), Science, and Social Studies. A total battery score is also provided, composed of reading, language, and Mathematics scores. Like the CAT, the CTBS has been standardized simultaneously with the Short Form Test of Academic Aptitude.

Iowa Tests of Basic Skills (ITBS): This battery is published by the Riverside Publishing Company. It is appropriate for students in grades K-8. The ITBS was normed on the same sample as the Cognitive Abilities Test (CogAT), an academic aptitude test. Thus, determination of aptitude-achievement discrepancies is facilitated when these two tests are used. Scores are provided for listening, word analysis, vocabulary, reading, comprehension, language (spelling, capitalization, punctuation, and usage), visual and reference materials, Mathematics (concepts, problem solving, computation), Social Studies, Science, writing and listening supplements, and basic and total battery.

Metropolitan Achievement Tests (MAT): Harcourt Brace Jovanovich publishes this battery which is appropriate for students in grades K-9. Six levels span the various grades, and two alternate forms of the Primer Level and three alternate forms of the other five levels are available. The Primer level includes scores for listening for sounds, reading, and numbers. The next level, Primary I, includes scores for word knowledge, word analysis, reading, Mathematics computation, and Mathematics concepts. Primary II includes these plus spelling and Mathematics problem solving. The remaining levels all provide scores for word knowledge, reading, language, spelling, Mathematics computation, Mathematics concepts and Mathematics problem solving. In addition, Science and Social Studies scores are available for the two higher levels.

Sequential Tests of Educational Progress (STEP): This battery is published by the Educational Testing Service. It is appropriate for grades 4 onwards and consists of four levels and two alternate forms. Scores are provided at the lowest three levels for English expression, reading, mechanics of writing, Mathematics computation, Mathematics basic concepts, Science and Social Studies. The highest level of the STEP does not include the mechanics of writing and Mathematics basic concepts subtests.

SRA Achievement Series (SRA): Published by Science Research Associates, the battery is appropriate for students in grades 1-9. Five levels cover the grade range, and no alternate forms are available. The two lowest levels include subtests for reading (word picture association, sentence-picture association, comprehension, vocabulary), Mathematics (concepts and computation) and language arts (alphabetization, capitalization, punctuation, spelling, and usage). The three highest levels include subtests for reading (comprehension, vocabulary total), language arts (usage, spelling, total), Mathematics (concepts, computation, total), Social Studies, Science and Uses of Sources.

Standard Achievement Test Series: Like the MAT, this battery is published by Harcourt Brace Jovanovich. Six levels are provided for the various grades and two alternate forms are available. Subtests for reading, Mathematics, and language arts are available at all levels. Except for the lowest level, scores are also provided for Science, Social Studies, and except at the highest level, listening comprehension. A unique feature of this Test is that it is available as either a basic battery, including only the reading, Mathematics, and language art subtests, or as a complete battery, including all the subtests. Practice tests are also available for all but the highest level.

Tests of Achievement and Proficiency (TAP): Published by Riverside Publishing Company, the TAP is appropriate for students in grades 9-12. The TAP is designed to allow for continuity with the ITBS, and also has been normed concurrently with the Cognitive Abilities Test (CogAT), an academic aptitude test. Thus, identification of aptitude-achievement discrepancies is facilitated when these two tests are used. Scores are provided for reading comprehension, Mathematics, written expression, using sources of information, Social Studies and Science; listening and writing supplements are also available.

13.5.2 Indian Achievement Tests

Some of the Indian standardized achievement tests are:

- C.I.E. Hindi Yogyata Pariksha for Class VII.
- Mother tongue test (Hindi) – B.K. Srivastava.
- Coimbatore Achievement Test (Social Science) – R.K. Mission.
- English Test – B.R.C., Agra.
- Mathematics Test – B.R.C., Agra.
- Mathematics Test (Tamil) – R.K. Mission.
- School Progress Record – L.N. Dubey.

Check Your Progress 3

Notes: a) Write your answer in the space given below.

b) Compare your answer with that given at the end of the unit.

1. What are the advantages in using a test battery instead of tests selected from a number of sources?

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13.6 ACADEMIC APTITUDE TESTS vs. ACHIEVEMENT TESTS

So far in this unit we have discussed tests that are used to measure past achievement. The intent of these tests is to identify what students have learned. At times, however, we are also interested in measuring an individual's potential for learning or an individual's academic aptitude. Such information is useful in making selection and placement decisions and to determine whether students are achieving up to their potential, that is, to indicate aptitude-achievement discrepancies. In short, aptitude tests are used to indicate aptitude-achievement discrepancies. Aptitude tests are used to predict future learning. While achievement tests are used to measure past learning.

Aptitude: Aptitude and potential can be considered synonymous for our purposes. They refer to the maximum we can expect from a student, as indicated by a student's score on a test of academic aptitude or potential. Such tests are often referred to as IQ tests or intelligence tests. For now, all we need to know is that such tests provide us with a benchmark or standard against which to compare achievement test scores.

The academic aptitude test provides us with an estimated ceiling for a student's academic performance. The academic achievement test, on the other hand, measures actual academic performance. Traditionally, students have been labeled overachievers or underachievers based on the relationship between their academic aptitude and academic achievement. Figure 13.2 illustrates an underachiever, an overachiever, and a student achieving at expectancy.

Student A in Figure 13.2 is a student with considerable potential who is not achieving up to his or her potential. Student B is a student with moderate potential who is achieving above his or her potential. More accurately, this "overachiever" is a student whose obtained aptitude score (not necessarily true score) is lower than his or her obtained achievement score. Student C represents a student achieving at the level we would expect, given his or her aptitude score. The obtained aptitude score is equivalent to the obtained achievement score.

Obviously, it is necessary to have an aptitude score to enable you to determine whether a student is achieving at expectancy (the level you would expect given the student's aptitude). However, school district policies vary in requiring the administration of aptitude tests. Depending on your district, you may have aptitude tests administered to students every few years, or only in the fifth, ninth and eleventh grades, or not at all.

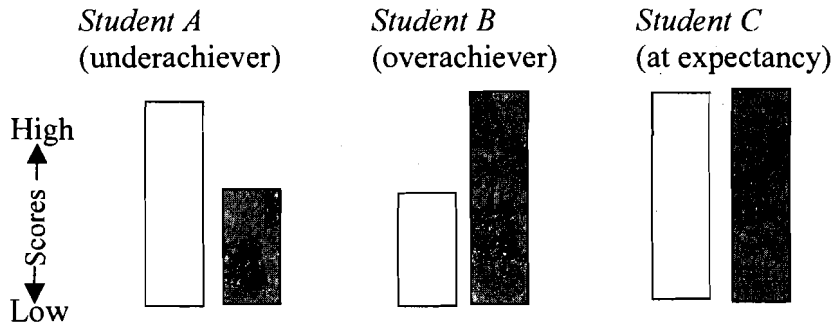


Fig.13.2: Relative Levels of Aptitude and Achievement for an Underachiever, an Overachiever, and a Student Achieving at Expectancy.

aptitude

achievement

If you find aptitude test scores in your students' folders, you can use them to enhance your achievement test interpretation. However, be careful not to simply label your students underachievers or overachievers.

Most aptitude tests yield more than one overall IQ score. Many yield a verbal and nonverbal score, or a language and non language score, or a verbal and a quantitative score. Quantitative scores represent general mathematical or number ability. When the aptitude or IQ test yields a verbal score and a nonverbal score or a quantitative score, more relevant comparisons are possible than when only one overall score is reported. Consider the following example:

Mona, a new seventh-grader, obtained the following scores on the cognitive abilities test (an aptitude test) at the beginning of sixth grade. (Note : X = 100, SD = 15).

Verbal = 100
Quantitative = 130

Mona's scores on the California Achievement Test (CAT) given at the end of sixth grade are as follows:

	Percentile rank
Reading Vocabulary	66
Reading Comprehension	60
Reading Total	63
Mathematical Concepts	99
Mathematical Computation	99
Mathematical Total	99

Mona's parents have requested a meeting with you. They want you to push her harder in reading until her reading scores match her mathematics scores which have been superior.

What would you do? How would you interpret Mona's scores? Would you push her in reading? Before you answer these questions, let's make Mona's data interpretable. We can do so by using bar graph comparisons to illustrate the concepts of underachievement and overachievement. This time we will add measurement scales to each histogram.

We know that an obtained IQ score of 100 is at the fiftieth percentile on an IQ test with a mean of 100 and a standard deviation of 15. We also know that on the same test an IQ score of 130 is at the ninety eighth percentile, two standard deviations above the mean. In the graphs in Figure 13.3 our percentile scales do not correspond directly to each other, but this is of little consequence since we are not interested in comparing reading with Mathematics. Rather, we are interested in comparing verbal aptitude with reading total, both of which are on the same scale, and quantitative aptitude with mathematics total which are also on a common scale.

From the graphs, we would conclude that Mona's obtained Mathematics achievement score actually exceeds the obtained Mathematics aptitude score. According to our popular but somewhat misleading terminology, she is overachieving in Mathematics. Unless she is paying a high price socially or emotionally for working so hard in Mathematics, we see no problem here. Hence, the qualifier "over" in the word overachiever should not imply a negative valuation of what has been accomplished by this student. But Mona's parents are not concerned with her Mathematics achievement.

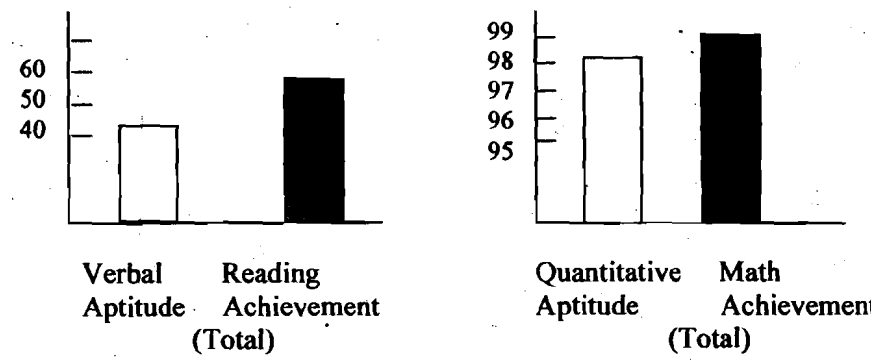
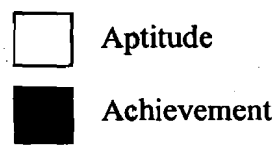


Fig.13.3: A Comparison of Mona's Aptitude and Achievement Scores Percentiles



They are concerned with her reading achievement. They want her pushed which suggests that they feel she can do better than she has achieved in the past. That is, Mona's parents feel she is underachieving in reading. Is she? On the basis of a comparison of her obtained verbal aptitude score and her obtained reading achievement score, our conclusion would have to be "no". In fact, Mona is "overachieving" in reading, too. That is, her obtained reading achievement score exceeds her obtained verbal aptitude score; she is actually

performing above expectancy. Would you agree that she needs to be pushed? By now, we should hope "not". In fact, you might suggest to Mona's parents that they ease up, using your skills in the interpretation of standardized test results to substantiate your suggestion.

13.6.1 Aptitude-Achievement Discrepancies

What we have been doing is making a general or global decision about whether or not Mona is achieving at her expected level, as indicated by her aptitude score. In other words, are there any differences between her aptitude and her achievement? When these differences are large enough to indicate substantial variation in the traits being measured, we call them aptitude-achievement "discrepancies". But when is a difference a discrepancy? How large must the gap be before we call a difference a discrepancy? Does this begin to sound familiar? We hope so, but if it does not, the next question should help. How large a difference do we need between an aptitude score and an achievement score before we can conclude that the difference is due to a "real" discrepancy, rather than a "chance" difference? We learned how to use the standard error of measurement (s_m) and band interpretation to discriminate real from chance differences among subtests in an achievement test battery. The same principle can be applied to discriminate real discrepancies from chance differences when dealing with aptitude and achievement test scores.

Check Your Progress 4

Notes: a) Write your answer in the space given below.

b) Compare your answer with that given at the end of the unit.

1. What is the use of academic aptitude test?

.....

.....

13.7 LET US SUM UP

Standardized tests are carefully constructed by curriculum experts, teachers and school administrators which carry standardized administration and scoring procedures. These tests are frequently used to make comparisons over time or across schools. Although the standardized tests are not as useful as the teacher-made tests for classroom teacher but accountability requirement have made it necessary for teachers to administer and interpret them. A comparison of standardized achievement test and teacher-made test is made on same points as purpose, quality of test items, reliability and administration and scoring of tests. When administering standardized tests all test administrators should follow instructions in order to minimize error in test administration.

Grade and age norms/equivalents are much less commonly used and suffer from limitations. Percentile ranks are superior to these two norms and are also suitable for interpreting test results to parents. Standard scores also compare a student's performance with that of his or her peers. Standard scores are

superior to percentile ranks for test interpretations but they tend to be not well understood by many educators and general public.

Standardized achievement test batteries are popular for school use. In these the advantage of unity in plan and standardization be weighed against a single achievement test. Some of the test batteries used are briefly described and enlisted in the unit. Standardized achievement tests tend to be carefully constructed and measure outcomes similar to those measured by academic aptitude tests. When an academic aptitude-achievement test discrepancy is found, the teacher's task is determine why the discrepancy exists, and then take appropriate steps to remedy it.

13.8 UNIT-END EXERCISES

1. How useful do you find standardized achievement tests for students?

2. Use a standardized achievement test and comment upon its utility for your students.

13.9 ANSWERS TO CHECK YOUR PROGRESS

Answers to Check Your Progress 1

1. Standardized achievement tests are based on common objectives and general content common to large number of schools over the country as compared to teacher-made test which is specific to his/her class. Standardized test is developed by specialists and is highly reliable as compared to teacher-made which is less reliable and developed by teacher himself or herself.

2. Standardized tests are used to:

   i) evaluate student's progress during the academic year or over a period of years,

   ii) group students for instructional purposes,

   iii) evaluate general educational development of students in the basic skills.

Answer to Check Your Progress 2

1. Percentile ranks are recommended for interpreting standardized test results to public.

Answer to Check Your Progress 3

1. Achievement test battery (1) to evaluate a school's educational program and its component, (2) to help the teacher plan the work of his/her class and grouping of students within it, (3) the likelihood of clerical errors is minimized when single, comprehensive score reports from a battery are used to make comparisons as opposed to several single subject score reports.

Answer to Check Your Progress 4

1. Tests of academic aptitude predict academic achievement. But how well they do predict depends on what we use as our outcome measure. Carefully constructed standardized achievements tests measure outcomes similar to those measured by academic aptitude tests.

13.9 SUGGESTED READINGS

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MUSEUM AND EDUCATION

Prabhas Kumar Singh

In the past, the responsibility of the Museum officials was limited to acquisition, conservation, research and display of different art, archaeological, ethnographical, scientific and technological objects. But in the modern world responsibility of the Museums have much wider role for the visitors. The visitors not only look at the objects and admire and enjoy them, but also learn from them and pass them to the succeeding generation. In a Museum, art objects which are most rare, most beautiful and most antique can be seen and studied freely.

Rarity is not the only consideration; their workmanship, historical association, connection with some important discoveries, links in the development of human culture, etc. are also taken Into account. Whatever is the collection, educating the public through various educational activities, is now regarded as one of the primary functions of a Museum.

HISTORY OF MUSEUM AND MUSEUM EDUCATION

“Museum, the temple of the Muses “, the very word conveys to the place of learning and study, The element of sacred temple and that of an educational institution had mingled in the Greek schools of philosophy of Pythagoras in the South Italy and Platos academy at (Sicily, Sicilia ‘i’ Italy), where the study of philosophy was regarded as a services to the Muses. Thus the temples of Muses were the temple of learning from the very inception of their evolution.

Like Muses, Goddess Saraswati, the goddess of learning in India was originally a river with seven streams. She was considered as a celestial river, descended from the sky. During the Vedic age, this celestial river with her varied Potentialities identified as one with Vag ”the Goddess of Speech”. The combined form came to be known as one with tag Devi’ and was taken as the personification of wisdom and eloquence and was praised as ‘Muse’. The first image of Vag Devi, also known as Saraswati with a temple at ‘Dhara’ was installed by the Paramara King Boja in 12th Century A.D. and there by he named the Temple as a Temple of Learning, “Saraswati Mandir”. Thus it is evident from the very beginning that museum had intricate relation with education. This tradition never ceased even today and few museums in Rajasthan and Gujarat are called “Saraswati Bhandar”.

However, the importance shifted from religious and ethical to the intellectual side for the first time in the Hellenistic Institute of Alexandria established in 283 B.C., where the term ‘museum’ was also used. It was an academic institution where scholars carried out research and higher learning in Social and Natural philosophies. Therefore, the instruction to instruct and aid research has been inseparable from the musewn idea even in its most embronic

form, when it was considered to be not more than a cabinet of curiosity. Study of such subjects led to the publication of encyclopedias in the 17th century to satisfy the curiosity of the learned. These collections of 17th and 18th centuries became the basis of the 19th century museums in world over. At the end of the 18th century, the "Louvre" in Paris was the first public museum established as part of the State education system.

In the 19th century, neither the class room nor Public Library could provide for the dual role of verbal teaching and means of communications. People find in the middle of the 19th century an institution called museum, which in theory at least could serve both needs. National Museums of Science and Art at South Kensington in London (now Science Museum & Victoria & Albert Museum), both established around the middle of the 19th century, were among the first large museums in the world, deliberately founded to exhibit the progress of scientific discovery and the best of aesthetic design, for both educational and economic purposes.

Joseph H. Choate at the opening of the new building of the Metropolitan Museum of Art, New York (1880) commented that their plan was not to establish a mere cabinet of curiosities which should serve to kill time for the idle, but gradually to get together a more or less complete collection of objects which should serve the purpose of instruction and enlightenment of the people.

since the early years of 20th century there has been an increasing acknowledgement in many countries on the importannce of educational function of museums. However, a serious and systematic thought to the problem on an international level was given in 1951, setting the stage for the UNESCO seminar on the educational role of museums held in Brooklyn in 1952. On return from the seminar many of the delegates conducted similar programmes in their countries. This could be said to be the scientific beginning in the field of over all museum education at an international level. An encouraging feature of the situation today is an increasing focus of interest on resources of our museums and their educational potential. A seminar arranged by the West Bengal Museum Association (1964) followed by similar seminar New Delhi (1966), was the beginning of harnessing the potential of museums for general education of the masses in India.

CHANGING ROLE OF MUSEUMS

The earlier museums were scholarship oriented, opened to scholars and members of royal houses, with object of curiosity. The common people did not have access to it. The two notable events in world history, viz. The American war of Independence (1776) and The French sevolution’s declaration of human and civil rights (1789) were a turning points and opened new vista for the development of education and culture. This new development further intensified the collection of objects of art and culture and a gradual increase in public access to museum collections. Education was put as one of the major function of museums.

DEFINITION OF MUSEUM

A museum is defined as “a non - profit making permanent institution, in the service of the society and its development and open to the public, which acquires, conserves, communicates and exhibits, researches for the purpose of study, education and enjoyment, material evidence of men and his environment". This declaration made in the Copenhegen 10th General Assembly of the International Council of Museums held in 1974 which is fairly comprehensive.

American Association of Museums defines a museum as “An organised and permanent, non-profit institution essentially educational or aesthetic in purpose, with professional staff which owns and utilizes tangible objects, earns for them and exhibits them to the public on some regular schedule.” This author define a museum as a service provider for the spread of knowledge.

There are many more definitions of museums that lay most emphasis on their role on education. The educational activities within the museums must be ready to provide a great variety of methods through which people can receive insights into and enjoyment of collections. The presence of objects that do not know the boundaries of language and literacy helps museums to be on advantageous position compared to other public service agencies, to serve as socially relevant agency for the education and development of the community.

In 42nd amendment of the Indian Constitution, out of 10 fundamental duties, 3 deals with the peoples concern for their past, present and future environment.

These are:-

1. To value and preserve the rich heritage of our composite culture.

2. To protect and improve the natural environment including forests, lakes, rivers and wild life and to have compassion for living creatures.

3. To develop scientific temper, humanism and the spirit of enquiry and reform.

Museums are the competent enough to help in fulfilling all the above goals. Museums can help people in acquiring perfection in life.

MUSEUM EDUCATION

DEFINITION OF EDUCATION:-

Education is defihed as the process of experience, generally called learning which brings in desirable changes in human behaviour; with respect to knowledge, outstanding skill and attitude.

MEANING OF MUSEUM EDUCATION:-

A Museum is not an educational institution in the formal sense of the word. Museum education is the education in its broader sense. Eilean Hooper Green Hill (1988) considers museum in the context of education, as an institution that can offer an educational experience

across a wIde range of variables and in relatlon to a wIde range of institutions and organizations. The meaning of museum education is that museums provide a learning situation in which the visitors experience learning. A learning situation is a condition or environment in which all the elements necessary for promoting learning are present. Learning experience is the mental or physical reaction or makes through seeing, hearing or doing the things to be learnt and through which one gains meanings and understanding of the materials to be learnt.

John Falk & Lynn (1992), who had extensively studied museum education in U.S.A, India, U.K and many other countries, described learning in museum as follows.

Learning in museums generally involves a visitor or a group of visitors attending to an object, a display, label, person, element or some mental construct of these. Museum learning has long been examined in relation to attracting power and loading power of exhibits in museums. The information thus collected by the visitors is stored in the brain and remains there over a period.

The information a visitor receives during a museum visit tends to bear a 'contextual map'. The museum visit represents a collection of experiences rather than a single unitary phenomenon. Any information obtained during the museum visit is likely to include social related, attitude related, cognitive related and sensory related association. These associations will become embedded in memory altogether with the result that anyone facet of these experiences can facilitate the recall of the entire experience.

Thus Museums are rather a source of intellectual stimulation and entertainment. Exhibition halls, properly arranged secondary collections, labels, guided tours, traveling exhibitions, school class visits, loan services to the schools, training courses to the teachers, illustrated lectures, motion pictures, film trips and publications, etc. are the various means which constitute the educational activities in a museum.

EXHIBITION, THE VITAL PART

The vital part of any museum are the objects themselves which are real and capable if correctly interpreted of conveying information in an accurate manner. Here lies the skill of a Curator, i.e. exhibiting the objects in such a way that the visitors are automatically drawn towards it. Label, both big gallery labels and short individual ones, in many cases, are needed for identification and understanding. These should be short, meaningful and to the point. It is the responsibility of the museums, apart from other functions to impart education through exhibition to the masses irrespective of their educational background. Now the museums belong to all, from retired old persons to a nursery children, from a sophisticated film actress to a house wife, from the richest to the poorest, the illiterates or semiliterates, the physically challenged, the minority groups and all are welcome to museum exhibition which provide indirect instruction in a discreet manner. The exhibition is the only language through which a museum can communicate and in order to make a direct impact on the masses, the

exhibition has to be meaningful. In the display, the objects, the surrounding and the lighting should be coordinated. Any topic like irrigation, soil erosion and soil conservation, ideal home, farm management, industry, social welfare, etc. can be selected for exhibition in order to educate the masses to improve their lot. Pictures, photographs, drawings, charts, models and other subsidiary materials can be used to explain all exhibit, supplementary to the object themselves.

EDUCATION THROUGH OBJECTS

Museum objects are important part of the cultural and natural heritage of a country. They act as important means of work and represent the basis of work, an object of research for various technical, social and natural science branches such as botany, zoology, history, history of art, archaeology, ethnography, etc. Objects can make unique contribution to our understanding of the working of individuals and societies. In short, it can tell us more about ourselves. Hence, we collect objects to show illustrative examples of societies and individuals. Learning directly from the objects provide an first hand experience to the learners. For example an individual who has seen and handle few fossils or examined an exhibit showing how fossils are formed would have a better knowledge about fossils then those who have only read about them. Sensory experiences form the basis of museum education.

Sensory exploration is one way to begin working with objects:

The foremost function of a modern museum is, therefore, to utilise the objects of the past as tools to generate knowledge and there by enlighten the minds of the public. The museums of modern times act as an academy and a school for the people at one and the same time. Hence, the educational work of a museum today, directly involves research scholars and educationists on the transmitting end and the people in general at the receiving end. The museum professionals and the educationists, who are responsible for the educational activities, should use their knowledge in the framework of the educational programs and present them to the people for their understanding, debate and adoptation. Of course, the research scholars, museum educationists and the public have to be directly involved with the museum materials. Thus the museum collectIons are the central point around which all interest and activities of specialists, educationists and the public revolve.

MUSEUMS IN SCHOOL EDUCATION

Museum provide learning situations is quite different from those provided by formal educational institutions like schools.

a) Museum provides free choice learning situations devoid of verbal instructions, assessment and other types of controls that exist in schools.

b) Learning in museums is a spontaneous process, a personal exeperience not imposed on the visitor.

c) Museum provide open communication of ideas, concepts and information involving exploration and discovery, and

d) Class rooms in schools are home for 3R's: reading, riting and rithmetic, where as museums are home for 3A's: the authentic, the aesthetic and the accessible. The authenticity as revealed by real objects and phenomena exhibited in museums, communicates with a powerful clarity to visitors. Museums are compelling aesthetic environments: they engage the senses, stimulate, inspires and some times even overwhelm. A museum makes the whole world, the past, the present and the imagined; accessible to the visitor. (Voris, H. H. Sedielarh, M. C. , Blockrnom, C. P. 1986)

COMPAIRISON OF LEARNING IN SCHOOLS AND MUSEUMS

TABLE

Subject	School	Museum
1. Free choice	No	Yes
2. Instruction based on	Text	Object
3. Senses most used	Oral	Visual
4. Syllabus-Oriented	Yes	No
5. Formal assessment	Yes	No
6. Time Schedule	Yes	No
7. Learning	Linear Non-Spontaneous	Multi-Faceted Spontaneous

SCHOOLS TO MUSEUMS

The potential of museums as institution that could implement and supplement School education has been organized all over the world. Programmes for School children have always been among the most frequent educational offerings of museums. The frequent visits of young pupils to museums, not only supplement their classroom teachings, but also create a love of beauty in many forms; which if properly absorbed in this formative stage of mind, will lead to a wider understanding and sometimes create specialized interest for the future.

Museums could contribute to School education in many ways, the most important being, visual communication through objects and materials. Subjects like History, Geography, Art, Physics, Chemistry, Astronomy, Health and Hygiene, Natural Sciences and even Mathematics could come alive more vividly and effectively through exhibits in museums representing the disciplines. Educational experiences obtainable in museums for school children may fall into two categories, experiences directly relevant to the school curriculum and experiences that provide a broader perspective for improving the general knowledge of students in different areas of humanities and sciences. To achieve these objectives of museum education relevant to school children, musueum authorities should make conscious efforts in providing these required medium of communication.

PLANNING ON THE PART OF MUSEUM

There may be several objects and exhibits in many museums which are related to the subjects taught in the school. Exhibition depicting Harappan Culture, Evolution of life, on electricity and magnetism for example, may form part of the display in Art, Natural History or Science museums as the case may be. They usually fom part of several other exhibits, some relevant to the school curriculum and others not. Where museums do not make any specific effort to cater directly to the school children teachers have to find ways and means of using those resources depending their relevance to class room teaching. These includes, identifying the exhibits relevant to the topic of instruction, making advance preparations on how to use them with the school group and from the museum seeking cooperation which is necessary to make the programme successful.

Since the school groups constitute the largest percentage among the museum visitors, museums should take a lead in preparing exhibits relevant to school education. Museums in the making, those in the process of reorganisation of those developing new exhibits, have an opportunity to consider, how they can make their displays relevant to the school curriculum. A Natural History Museums that develops exhibits on evolution, ecology or conservation of natural resources could, without distinct to their over all purpose and theme of communication, provide a large number of exhibits which are directly related to the school curriculum. The museum authority should examine the school curriculum and identify themes and topics that could be presented in the galleries.

PLANNING ON THE PART OF SCHOOL TEACHER.

Museum visits by school groups are often unplanned resulting a number of children rushing through the galleries without an opportunity for observation and discovery. This can be avoided and the visits could be made productive only when teachers plan the visit well in advance in consultation with the museum authorities. The class may be grouped into batches not more than 20 children to be taken care of by the education officer or by the teachers themselves. The attention of the students should be focused to the exhibits, relevant to the themes and concepts under consideration and encourage an interactive session with them. Educational materials relevant to the subject, such as work sheets, lnformation leaflets, etc. should be used.

PARTICIPATORY EXHIBITS FOR CHILDREN.

According to an Old Chinese proverb, “I hear, I forget, I see, I remember, I do, I understand”, underlies the concept of ‘ participatory exhibits in museums. It enhances the quality and efficiency of communication. A child’s ability to grasp information from an exhibit is dependent upon how he correlates the object on a situation with his personal experience. Participatory exhibits includes, where the visitor walk into an exhibit like a walk through diorama of a forest, walk through model of a heart, etc. Working models which can be activated by the visitors, exhibits that are to be manipulated to find answers to questions,

quiz and discovery boxes, etc. Most of the Science Museums have a large number of such participatory exhibits.

DISCOVERY ROOM

The concept has been developed in some American Natural History Museums as educational devices. In India too, in Museums like National Museum of Natural History, New Delhi, has Discovery Room based on similar pattern. These informal children's area provides a direct hand on experience for them to handle and examine specimens and participate in several educative activities. These enable children to explore and become familiar with a wide range of objects at their own place in a related atmosphere.

OUTREACH PROGRAMMES

LOAN KITS

Simply a school loan kit is a box containing information in respect of specific themes such as shells, fossils, food chain, solar system, etc. Each loan kit box generally contains copies of original objects, charts, models, colour plates and teachers guide. It acts as medium for spreading non-formal education. While designing the Ioan kit box, emphasis always given on how to convey ideas in respect of each topic to the users in a very clear way and within a short time. For example in kit containing Plaster Cast of objects relevant to the Harappan Culture or an exhibit on the life cycle of all object could be used by a history or biology teacher while dealing with the above topics. Close cooperation between the school teachers and the museums would be useful in deciding the themes for producing School Loan Kits and also for their proper utilization.

LOAN KITS FOR RURAL SCHOOL

It is a fact that in most of the countries like India, few Schools based on urban areas are provided with the facilities to get loan kit service. About 70% of the populations are living in the villages. Most of the village schools do not get an opportunity to visit a museum. Such rural schools should be provided with loan kit services.

FIELD TRIPS

Another area in which a museum could contribute to School Education is by organizing field trips that fall within the educational scope of the museum. Natural History museums, concerned with environmental education should organize such field trips in order to develop in depth understanding and love for nature, ecology, wild life, flora and fauna, conservation, etc. Since school education is too much examination and curriculum oriented, museums of all types can take a lead to organize such programmes to enhance the quality of education. Such visits should be followed by observation, memory tests and on the spot competitions in drawing and painting, quiz and contest on ecology and environment. To make the programmes successful, the museum authority should waive their usual entry fees and if possible provide subsidized transport facilities. These types of programmes have

tremendous multiplier effect as school teachers and parents are also involved in acquiring information for helping the child in his/her preparation. Visits to the neighboring monuments, cultural sites and archaeological excavations can also be arranged.

SUMMER CLASSES

The museums in collaboration with schools and NGO's can hold summer classes in painting, crafts, modeling or on environment exploration. These programmes not only developed the skill and talent of the students, but also make youngsters aware of environmental and cultural issues and the way they can maintain in contributing conservation efforts.

MUSEUM TO SCHOOLS

Every school should aim at developing a small school museum by taking aid and advice from the museum personal. It should contain collection of specimens made by students, pictures, charts, and models relevant to school curriculum. School children are excellent collectors and if a call will be given by their teachers, they can assemble such valuable collections of natural history objects, photographs, objects of art and so on. The museums also should supply selected replicas, objects, miniatures and painting. It will take the message of the museum to the doorsteps of the children. It will highly be useful both to the students and teachers. In the process of learning through observation and discovery, museums are adjuncts to school education.

TRAINING OF SCHOOL TEACHERS

In certain countries, special trainings are given to the school teachers so that they can make full use of the museum materials for class room teaching. Museum in many European countries arrange short-term courses and lectures for the students in teacher training colleges. The purpose of such training in Victoria and Albert museum is to encourage immediate experience of the objects.

SHORT TERM TRAINNING COURSES

Short term Training courses on display, conservation, museology may be arranged for teachers of Drawing and Painting, Social Sciences, Life Sciences, Chemistry, Librarian and Laboratory Assts. These could be helpful not only in raising school museums but also in the general maintenance of the school libraries, laboratories, the drawing rooms and the teaching aid dept. Short term in service training courses among the museum personnel organised by the National Museum, New Delhi; Indian Museum, Calcutta; and other leading museums have been found very successful.

SPECIAL EDUCATIONAL PROGRAMMES FOR PHYSICALLY CHALLENGED

Museum can help the physically challenged in understanding and appreciating the cultural heritage housed in them. Museums should have a special room where they can show a limited number of objects, which will enable the mentally challenged visitors to have

a close understanding of the objects. They can receive training with the use of replicas and enlarged photographs, audio-visual media, preferably in local languages will be effective use as it combines the two sensory impressions for all the physically challenged, except the visually impaired and to a certain extent deaf. The orthopaedically challenged are the best visitors among the physically challenged who can witness the museum on a full fledged way. In order to make their visit more useful, the museum should provide ramps and lifts. The display of the exhibits should be in such a way as to provide more space to take a wheel chair and the door ways should be easily negotiable. For the deaf and dumb visitors, the service of a specifically trained instructors in this language of sign and symbols is a must. Gallery of touch should be organised for the visually impaired visitors, where replica of selected objects can be displayed along with “Braille labels”, so that they can be provided an opportunity to understand and differentiate form and shapes and identify the objects. Specially designed kit boxes on the models of specimens and antiquities will be very useful to the physically challenged and especially to the visually impaired, who can get a clear concept of a big animal, a bird, a tree or any other things.

In addition, the museum in collaboration with other organization working for the disabled, for the development and exposure of their hidden talents, competitions on drawing, painting, clay modeling, etc. should organize. In those programmes, normal children should also be invited, so that the physically challenged children will get chance to meet the normal children. Museums can send models and photos on loan to the institutions dealing with the physically challenged to provide them opportunity to touch and learn. A short term training course in art and its appreciation can be organized by the museum for the teachers working in the institution connected to physically challenged. A specific day can be set apart by the museums especially for the physically challenged. The educational role of the museum will be incomplete if it does not think and work out schemes for the physically challenged community.

GUIDED TOURS

The most common educational programme in any museum is the guided tour generally by the staff members. An audio-visual programme on a brief introduction explaining the background of the exhibits prior to the visit will probably leave a better effect. Gallery talks on fixed days with advance intimation to the public through the newspapers or any other media are also found useful. Here, the visitors get an opportunity to discuss their experiences with one another. In a country like India, where the majority of the visitors are either semi literates or illiterates, such personal communication and interaction of ideas between a guide and the visitors is of great use. It should be noted that a guide must be a knowledgeable person with a loud and clear voice. It is observed that a loud, clear and a modulated voice are more effective in keeping the visitors engrossed and attentive than a lowpitched monotonous lecture. A guide also should judge the age and interest of the visitors.

Besides, there are other electronic lecture guides, such as loop aerial system, the static speech-reproducing box and the miniature portable machine known as ‘guide a phone’

found very useful to the visitors. In the loop aerial system, an ordinary tape recorder plus an amplifier act as a broadcasting station which feed a loop aerial fixed around the ceiling of the gallery. The recorded lecture is received through the agency of a portable receiver, which the visitor carries with him. In the speech reproducing machine, a small box is stationed near the particular object. The visitor can listen to the commentary after pressing the appropriate button.

This system does not provide guided tour to the whole gallery but suited to a suitable interesting piece.

The miniature portable machine is an ordinary tape play back machine in which information about the gallery is pre recorded on tap. The visitor can carry it without physical inconvenience and gives an independent charge to move, pause and examine the objects at his own choice, without disturbing others in the gallery.

MUSEUM TO PEOPLE

Due to lack of awareness and transport facilities a large number of people could not able to see even the near by museum. To overcome this problem, museum should organize mobile exhibitions on bus, truck, jeep and special vehicles. Replicas, fascimiles and few original objects, film units lectures illustrated with slides are arranged in this van, which moves from place to place. The periodical exhibitions organized on different aspects of Indian art, culture, flora and fauna and applied sciences may be circulated from time to time for the benefit of the students as well as the general public. The other vital areas like the health, hygiene, agriculture etc. should also be covered.

The museums must undertake the socio-economic and cultural surveys to identify the Public of their respective areas in order to formulate their educational programmes for the community.

EDUCATIONAL ACTIVITIES THROUGH ELECTRONIC TECHNOLOGY

Apart from daily film shows and slide projections, museums around the world are increasingly using modern electronic equipments and techniques in their exhibitions and interpretation. For example, the sequential lighting with commentaries and guide phones are used to depict the story of “Evolution of Earth”. Similarly the ‘Theory of origin of Earth’ is also explained to the visitors with the help of sequential lighting and commentary. Similar animation techniques are used in communicating various ecological concepts, such as bio-geochemical cycles, photosynthesis, soil erosion and cellular defense. Apart from these, at places, there are provisions in the natural history galleries for continuous running of 8mm video films by using the photo phone equipments, due to changing in visitor behavior, the available electronic techniques museum text or labels would gradually be replaced by A.V. and electronic techniques i.e. Television, Video and Computer Servers. Kiosk **T.V.** and **Plasma T.V.** are also found very useful in the exhibition galleries to understand the theme and functions of objects without hthe helpf of guide lecturer. These educational programmes can provide

multisensory experience that stimulates active response in the museum visitors. Thematic and conceptual displays are better communicated by the use of electronic media. Computer programmes, games and graphics are being increasingly used in museums to get the concept on theme of the exhibit across to the visitor. Such exhibits provide both fun and education. The Bioscience 'Computer Room' of the National Museum of Natural History, New Delhi, has a series of personal computers (PC's) for interactive and participatory experience of visits to understand the function of DNA, the process of photosynthesis, working of eye, muscles, skeleton systems etc. Visitors especially school children, find this facility of fascinating learning experince.

DIORAMA

Today, the public is very keen on the kind of display that recreates nature, technically known as diorama. When a natural history specimen has been implanted, it can be set in its ecological setting called the 'diorama'. It is of great educational value to accelerate the eco system in which the specimen has developed and thus the diorama gives an idea of what things are actually like. A few diorama series are also suggested for a museum to illustrate the importance of plant environment so as to educate people on the need for growing pant in their houses and surroundings.

EDUCATION THROUGH PUBLICATIONS & RESEARCH

Through publications a museum can transmit its research to the scholars and general public. There are three kinds of publications namely.

1. The outcome of the serious researches conducted on the subjects and published in the form of journals, catalogues, brochures, monographs or books.

2. Publications in the form of reports, guidebooks, introductory leaflets, etc. to familiarize the people with the museum and its activities.

3. Special publications on the occasion of new gallery, special exhibitions, anniversary to popularize the museum within the community.

The other publications in general are as follows:-

1. **News Bulletin:-** It keeps the public informed about the activities of the museum. It covers subjects like current activities, announcement of important acquisitions, notices of special exhibitions, lectures, concerts, etc.

2. **Handbooks:-** It gives a brief outline of the museum, deal with gallery, special collection or a homogeneous group of objects in detail.

3. **Picture-Books:-** These are the collections of photographs of the masterpieces in a museum with their brief descriptions under a colourful background. Similarly folders, leaflets, guide maps, briad sheets, picture post-cards and transparencies are various other publications brought out by museums to acquaint the people with their special activities.

4. **Basic Science Articles:-** Popular basic science articles for school educations should be published. The education in a museum should be based upon research, which applies specially to museum exhibits. The publication should have social communication and educational values.

Apart from providing the fundamentals of knowledge in the specific fields, the museum preserves and provides the basic material for research in practically all the academic disciplines like art, archaeology, anthropology, science, dance, music, technology, etc. Museums are the best centers of bringing out research works of repute. Since the Curators have a direct access to the original source material.

SAVE OUR HERITAGE

We have inherited a large number of cultural properties in the form of manuscripts, paintings, textiles, coins, arms and armour, leather goods etc., which are prone to deterioration. The museums as the custodian of those cultural heritage, is the right answer to the recourse of education and culture. Many of the artistic creations have already been destroyed by the ravages of nature, human vandalism, fire and war. What remains had to be preserved at all cost, so that the future generations may have access to the ancient archaeological, ethnological, works; it is the responsibility of the present generation to provide for their preservation and take care of the objects it has inherited from the past.

PUBLICITY AS A MEDIA OF EDUCATION

Publicity has a tremendous effect on our day to day life. It is through planned publicity that the museum can reach the masses. The radio, T. V. and press are very powerful media. Advertisement through the radio, small television features and frequent articles on museum news in the magazines constantly remind people of the existence of a museum in their city to which they owe at least one visit. The museum friends or those interested in participating in some of the programmes are informed well in advance about the activity, through the “Museum Calendar’ which gives information regarding the forthcoming events. Big Posters of art objects can be displayed at all important public places. One very inexpensive method is putting of rubber stamps on every letter despatched from the museum announcing the special exhibition and thus the news can be spread far and wide. Such organized publicity programmes attract many visitors and impart education even to those who are unable to come to the musuems.

EPILOGUE

Coordination between the museum, educational institutions and NGO’s is the need of the hour. It is a fact that education is the potent instrument for human development, on which depends the level of allround national development. It is also agreed by all the countries and international organization like UNESCO and ICOM that people of all age groups and intellectual background can meet this gap in the field of communication through the effective use of museums and their collections by arranging thematic exhibitions. This requires linking

up these institutions with various educational efforts, planning and development programmes operating in the country. It would need adequate resources in space, finally and man power, which could be available with a strong background and keen interest of the authorities responsible for the development of museum educational programmes, which is yet to be fulfilled in the country like India. The museum has to serve as an instrument for education and cultural development for all, from the illiterate masses to the enlighten class. A museum philosophy and museum ethics have to be established so that an awareness and sensitivity is created and more and more people be attracted to museums. In a developing countries like ours, the educational activities in a museum is new weapon, a new tool to be exploited for the allround growth and understanding of the people. The museum provides a quick, effective and economical way of building of a nation, its background, resources, history, culture, crafts and arts. Therefore, if museums are to continue and progress, they cannot avoid serving this cause of education, and if education is to be effective, it dare not neglect the museums,

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Constructivist teaching methods

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Constructivist teaching is based on constructivist learning theory. This theoretical framework holds that learning always builds upon knowledge that a student already knows; this prior knowledge is called a schema. Because all learning is filtered through pre-existing schemata, constructivists suggest that learning is more effective when a student is actively engaged in the learning process rather than attempting to receive knowledge passively. A wide variety of methods claim to be based on constructivist learning theory. Most of these methods rely on some form of guided discovery where the teacher avoids most direct instruction and attempts to lead the student through questions and activities to discover, discuss, appreciate and verbalize the new knowledge.

History

Constructivist teaching methods are based on constructivistlearning theory. Along with John Dewey, Jean Piaget researched childhood development and education. Their theories are now encompassed in the broader movement of progressive education.

Constructivist learning theory says that all knowledge is constructed from a base of prior knowledge. Children are not a blank slate and knowledge cannot be imparted without the child making sense of it according to his or her current conceptions. Therefore children learn best when they are allowed to construct a personal understanding based on experiencing things and reflecting on those experiences.[1]

Constructivist teaching strategies

Characteristics of Constructivist Teaching

One of the primary goals of using constructivist teaching is that students learn how to learn by giving them the training to take initiative for their own learning experiences.

According to Audrey Gray, the characteristics of a constructivist classroom are as follows:

- the learners are actively involved
- the environment is democratic
- the activities are interactive and student-centered
- the teacher facilitates a process of learning in which students are encouraged to be responsible and autonomous

Examples of constructivist activities

Furthermore, in the constructivist classroom, students work primarily in groups and learning and knowledge are interactive and dynamic. There is a great focus and emphasis on social and communication skills, as well as collaboration and exchange of ideas.[1] This is contrary to the traditional classroom in which students work primarily alone, learning is achieved through repetition, and the subjects are strictly adhered to and are guided by a textbook. Some activities encouraged in constructivist classrooms are:

- Experimentation: students individually perform an experiment and then come together as a class to discuss the results.
- Research projects: students research a topic and can present their findings to the class.
- Field trips. This allows students to put the concepts and ideas discussed in class in a real-world context. Field trips would often be followed by class discussions.
- Films. These provide visual context and thus bring another sense into the learning experience.
- Class discussions. This technique is used in all of the methods described above. It is one of the most important distinctions of constructivist teaching methods.[2]

Constructivist approaches can also be used in online learning. For example, tools such as discussion forums, wikis and blogs can enable learners to actively construct knowledge.

Because existing knowledge schemata are explicitly acknowledged as a starting point for new learning, constructivist approaches tend to validate individual and cultural differences and diversity

Role of teachers

In the constructivist classroom, the teacher's role is to prompt and facilitate discussion. Thus, the teacher's main focus should be on guiding students by asking questions that will lead them to develop their own conclusions on the subject.

David Jonassen identified three major roles for facilitators to support students in constructivist learning environments:

- Modeling
- Coaching
- Scaffolding[3]

Constructivist Learning Environments (CLEs)

Jonassen has proposed a model for developing constructivist learning environments (CLEs) around a specific learning goal. This goal may take one of several forms, from least to most complex:

- Question or issue
- Case study
- Long-term Project

- Problem (multiple cases and projects integrated at the curriculum level)

Jonassen recommends making the learning goals engaging and relevant but not overly structured.

In CLEs, learning is driven by the problem to be solved; students learn content and theory in order to solve the problem. This is different from traditional objectivist teaching where the theory would be presented first and problems would be used afterwards to practice theory.

Depending on students' prior experiences, related cases and scaffolding may be necessary for support. Instructors also need to provide an authentic context for tasks, plus information resources, cognitive tools, and collaborative tools.[3]

Constructivist assessment

Traditionally, assessment in the classrooms is based on testing. In this style, it is important for the student to produce the correct answers. However, in constructivist teaching, the process of gaining knowledge is viewed as being just as important as the product. Thus, assessment is based not only on tests, but also on observation of the student, the student's work, and the student's points of view.[1] Some assessment strategies include:

- Oral discussions. The teacher presents students with a "focus" question and allows an open discussion on the topic.
- KWL(H) Chart (What we **know**, What we **want** to know, What we have **learned**, **How** we know it). This technique can be used throughout the course of study for a particular topic, but is also a good assessment technique as it shows the teacher the progress of the student throughout the course of study.
- Mind Mapping. In this activity, students list and categorize the concepts and ideas relating to a topic.
- Hands-on activities. These encourage students to manipulate their environments or a particular learning tool. Teachers can use a checklist and observation to assess student success with the particular material.
- Pre-testing. This allows a teacher to determine what knowledge students bring to a new topic and thus will be helpful in directing the course of study.[2]

An example of a lesson taught with a Constructivist background

A good example of a lesson being taught in a constructivist way, with the teacher mediating learning rather than directly teaching the class is shown by the example of Faraday's candle. There are various forms of this lesson, but all are developed from the Christmas lectures Faraday gave on the functioning of candles. In open constructivist lessons using these lectures as a basis, students are encouraged to discover for themselves how candles work. They do this first by making simple observations, from which they later build ideas and hypotheses which they then go on to test. The teachers acts to encourage this learning. If successful, students can use this lesson to understand the components of combustion, an important chemistry topic.[4]

Constructivism for Adults

Constructivist philosophy has a long history of application in education programs for young children, but is used less frequently in adult learning environments. As humans develop, there are qualitative changes in their ability to think logically about experiences, but the processes by which learning occur, cognitive adaptation and social mediation, are believed to be continuous or remain the same throughout the life.[5] At the heart of constructivist philosophy is the belief that knowledge is not given but gained through real experiences that have purpose and meaning to the learner, and the exchange of perspectives about the experience with others [6] (Piaget & Inhelder, 1969; Vygotsky,1978).

Learning environments for adults based on constructivist philosophy include opportunities for students to make meaningful connections between new material and previous experience, through discovery. One of the simplest ways to do this is asking open-ended questions. Open-ended questions such as "Tell me about a time when…." or "How might this information be useful to you?" causes learners to think about how new information may relate to their own experience. Student responses to such questions are opportunities for experiencing the perspectives of others. For these questions to be effective it is critical that instructors focus on teaching content that is useful for participants. The importance of using these types of strategies with adults contributes to what [7] Bain(2004 p. 4) noted as critical learning environments where instructors "embed" the skills they are teaching in "authentic tasks that will arouse curiosity, challenge students to rethink assumptions and examine their mental modes of reality".

Such approaches emphasize that learning is not an "all or nothing" process but that students learn the new information that is presented to them by building upon knowledge that they already possess. It is therefore important that teachers constantly assess the knowledge their students have gained to make sure that the students' perceptions of the new knowledge are what the teacher had intended. Teachers will find that since the students build upon already existing knowledge, when they are called upon to retrieve the new information, they may make errors. It is known as reconstruction error when we fill in the gaps of our understanding with logical, though incorrect, thoughts. Teachers need to catch and try to correct these errors, though it is inevitable that some reconstruction error will continue to occur because of our innate retrieval limitations.

In most pedagogies based on constructivism, the teacher's role is not only to observe and assess but to also engage with the students while they are completing activities, wondering aloud and posing questions to the students for promotion of reasoning (DeVries et al., 2002). (ex: I wonder why the water does not spill over the edge of the full cup?) Teachers also intervene when there are conflicts that arise; however, they simply facilitate the students' resolutions and self-regulation[*disambiguation needed*], with an emphasis on the conflict being the students' and that they must figure things out for themselves. For example, promotion of literacy is accomplished by integrating the need to read and write throughout individual activities within print-rich classrooms. The teacher, after reading a story, encourages the students to write or draw stories of their own, or by having the students reenact a story that they may know well, both activities encourage the students to *conceive themselves* as reader and writers.

Arguments against constructivist teaching techniques

Main article: Constructivism (learning theory)

Critics have voiced the following arguments against constructivist based teaching instruction:

- A group of cognitive scientists has also questioned the central claims of constructivism, saying that they are either misleading or contradict known findings.[8]

- One possible deterrent for this teaching method is that, due to the emphasis on group work, the ideas of the more active students may dominate the group's conclusions.[1]

While proponents of constructivism argue that constructivist students perform better than their peers when tested on higher-order reasoning, the critics of constructivism argue that this teaching technique forces students to "reinvent the wheel." Supporters counter that "Students do not reinvent the wheel but, rather, attempt to understand how it turns, how it functions."[1] Proponents argue that students — especially elementary school-aged children — are naturally curious about the world, and giving them the tools to explore it in a guided manner will serve to give them a stronger understanding of it.[1]

Mayer (2004)[9] developed a literature review spanning fifty years and concluded "The research in this brief review shows that the formula constructivism = hands-on activity is a formula for educational disaster." His argument is that active learning is often suggested by those subscribing to this philosophy. In developing this instruction these educators produce materials that require learning to be behaviorally active and not be "cognitively active."[9] That is, although they are engaged in activity, they may not be learning (Sweller, 1988). Mayer recommends using guided discovery, a mix of direct instruction and hands-on activity, rather than pure discovery: "In many ways, guided discovery appears to offer the best method for promoting constructivist learning."[9]

Kirchner et al. (2006) agree with the basic premise of constructivism, that learners construct knowledge, but are concerned with the instructional design recommendations of this theoretical framework. "The constructivist description of learning is accurate, but the instructional consequences suggested by constructivists do not necessarily follow." (Kirschner, Sweller, and Clark, 2006, p. 78). Specifically, they say instructors often design unguided instruction that relies on the learner to "discover or construct essential information for themselves" (Kirchner et al., 2006, p75).

For this reason they state that it "is easy to agree with Mayer's (2004)[9] recommendation that we "move educational reform efforts from the fuzzy and nonproductive world of ideology—which sometimes hides under the various banners of constructivism—to the sharp and productive world of theory- based research on how people learn" (p. 18). Finally Kirschner, Sweller, and Clark (2006) cite Mayer[9] to conclude fifty years of empirical results do not support unguided instruction.

Another important consideration in evaluating the potential benefits/limitations of constructivist teaching approach is to consider the large number of varied personal characteristics as well as

prevalence of learning problems in children today. For example, in a solely constructivist approach was employed in a classroom of you children then a significant number of children, for example say with Attention Deficit/Hyperactivity Disorder, might not be able to focus on their perceptions of learning experiences long enough to build a knowledge base from the event. In other words, constructivist theory is biased to students who desire to learn more and are capable of focusing attention to the learning process independently. A mixed approach that incorporates components of constructivist learning along with other approaches, including more guided teaching strategies, would better meet the learning needs of the majority of students in a classroom by accounting for differences between learning styles and capacities.[*citation needed*]

Specific approaches

Specific approaches to education that are based on constructivism include:

The embedded lists in this article **may contain items that are not encyclopedic**. Please help out by removing such elements and incorporating appropriate items into the main body of the article. *(December 2010)*

- Constructionism
  - An approach to learning developed by Seymour Papert and his colleagues at MIT in Cambridge, Massachusetts. Papert had worked with Piaget at the latter's Institute in Geneva. Papert eventually called his approach "constructionism." It included everything associated with Piaget's constructivism, but went beyond it to assert that constructivist learning happens especially well when people are engaged in constructing a product, something external to themselves such as a sand castle, a machine, a computer program or a book. This approach is greatly facilitated by the ready availability of powerful 'constructing' applications on personal computers. Promoters of the use of computers in education see an increasing need for students to develop skills in Multimedia literacy in order to use these tools in constructivist learning.
- Reciprocal Learning
  - Two teach each other.
- Procedural Facilitations for Writing
- Critical Exploration (Duckworth, 2006) The two components of critical exploration are curriculum development and pedagogy. In this method teachers find ways to encourage their students to explore the subject matter and express their thoughts on the material(Duckworth).
- Cognitively Guided Instruction
  - A research and teacher professional development program in elementary mathematics created by Thomas P. Carpenter, Elizabeth Fennema, and their colleagues at the University of Wisconsin-Madison. Its major premise is that teachers can use students' informal strategies (i.e., strategies students construct based on their understanding of everyday situations, such as losing marbles or picking flowers) as a primary basis for teaching mathematics in the elementary grades.
- Inquiry-based learning

- Problem-based learning
- Cognitive apprenticeships
- Various methods involving collaboration or group work
- Cooperative learning (reciprocal questioning, Jigsaw Classroom, structured controversies)
- Anchored Instruction (Bransford et al.)
    - Problems and approaches to solutions are embedded in a narrative environment.
- Cognitive Apprenticeship (Collins et al.)
    - Learning is achieved by integration into a specific implicit and explicit culture of knowledge.
        - Six features of cognitive apprenticeships: modeling of the performance, support through coaching/tutoring, scaffolding, students articulate knowledge, reflection on progress, exploration of new applications. (Woolfolk, 2010)
- Cognitive Flexibility (Sprio et al.)
    - A constructivist approach to curriculum design, in which the learning activities spelled out in the intended learning outcomes are built into the teaching methods and assessment tasks.
- The Silent Way
    - A constructivist approach to foreign language teaching and learning developed by Caleb Gattegno who worked with Piaget before WWII and in the late 1940s.

See also

- learning theory
- childhood development
- progressive education
- Constructivist epistemology
- Constructivism (learning theory)
- Montessori method

External links

- Constructivist Teaching and Learning Models
- SSTA Research Centre Report on Constructivist Teaching and Learning
- Constructivist Teaching
- Association for Constructivist Teaching
- Constructivist Teaching Practices: Perceptions of Teachers and Students
- Constructivist Learning and Teaching
- Constructivism as a Paradigm for Teaching and Learning

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Computer Assisted Instruction (CAI): A New Approach in the Field of Education

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Abstract: ***The main aim of the paper is to provide a brief outline of Computer Assisted Instruction (CAI) Which is being used widely in all sectors of life including educational sector. The paper also stated that how this new technology can be used for instructional purposes in teaching- learning process. Lastly the paper also mentioned some limitations of the CAI.***

Keywords: Computer Assisted Instruction (CAI), Programmed logic for Automatic Teaching Operation (PLATO). Time-shared Interactive Computer-Controlled Information Television (TICCIT),

1. Introduction

Computer-Aided Instruction (CAI) is a diverse and rapidly expanding spectrum of computer technologies that assist the teaching and learning process. CAI is also known as computer-assisted instruction. Examples of CAI applications include guided drill and practice exercises, computer visualization of complex objects, and computer facilitated communication between students and teachers. The number of computers in American schools has risen from one for every 125 students in 1981 to one for every nine students in 1996. While the United States leads the world in the number of computers per school student, Western European and Japanese schools are also highly computerized. Computer has contributed a lot in each and every sector of life especially in education sector.

CAI – Terminology
As with any field of learning, acronyms abound in the computer assisted instruction/learning domain. Terms vary in the breadth of their definition, or their specificity. It shows a brief list of some of the main terms that are used in CAI related field.

CBT - Computer Based Training
CAI - Computer Assisted Instruction
CAL - Computer Assisted Learning
CALL - Computer Assisted Language Learning
WBI - Web Based Instruction
WBT - Web Based Training

The term CAI, as the name suggests, is the use of a computer to provide instruction. The format can be form a simple program to teach typing to a complex system that uses the latest technology to teach new keyhole surgery techniques. CAI draws on knowledge from the fields of learning, cognition, Human Computer Interaction (HCI) amongst others.

2. Objectives

CAI is a natural outgrowth of the application of the principles of programmed instruction of learning. The main objective of the programmed instruction is to provided individualized instruction just to fulfill the special needs of the individual pupil. In order to achieve this objective, some efficient device is required. This device should be flexible and it can store huge amounts of organized information. The device may enable a person to use some selected part of the stored information. A computer fulfils all these requirements. It can store the organized information, it can process the information suiting to the needs of individual learner. In short, CAI covers the entire educational system by proving itself in useful tool in teaching various subjects.

3. History

In the mid-1950s and early 1960s collaboration between educators at Stanford University in California and International Business Machines corporation (IBM) introduced CAI into select elementary schools. Initially, CAI programs were a linear presentation of information with drill and practice sessions. These early CAI systems were limited by the expense and the difficulty of obtaining, maintaining, and using the computers that were available at that time. Programmed Logic for Automatic Teaching Operations (PLATO) system, another early CAI system initiated at the University of Illinois in the higher learning. It consisted of a mainframe computer that supported up to 1000 terminals for use by individual students. By 1985 over 100 PLATO systems were operating in the united States. From 1978 to 1985 users logged 40 million hours on PLATO systems. PLATO also introduced a communication system between students that was a forerunner of modern electronic mail (messages electronically passed from computer to computer). The Time-shared Interactive Computer-Controlled Information Television (TICCIT) system was a CAI project developed by Mitre Corporation and Brigham Young University in Utah. Based on personal computer and television technology, TICCIT was used in the early 1970s to teach freshman-level mathematics and English courses. With the advent of cheaper and more powerful personal computers in the 1980s, use of CAI increased dramatically. In 1980 only 5 percent of elementary schools and 20 percent of secondary schools in the United States had computers for assisting instruction. Three years later, both numbers had roughly quadrupled, and by the end of the decade nearly all schools in the United States, and in most industrialized countries, were equipped with teaching computers. A recent development with far ranging implications for CAI is the vast expansion of the Internet, a consortium of interlinked

computers. By connecting millions of computers worldwide, these networks enable students to access huge stores of information, which greatly enhances their research capabilities. Computers are being used in almost all areas of life i.e., transportation, communication, national defense, scientific research and education.

4. Types of CAI

Information that helps teach or encourages interaction can be presented on computers in the form of text or in multimedia formats, which include photographs, videos, animation, speech, and music. The guided drill is a computer program that poses questions to students, returns feedback, and selects additional questions based on the students' responses. Recent guided drill systems incorporate the principles of education in addition to subject matter knowledge into the computer program. Computers also can help students visualize objects that are difficult or impossible to view. For example, computers can be used to display human anatomy, molecular structures, or complex geometrical objects. Exploration and manipulation of simulated environments can be accomplished with CAI-ranging from virtual laboratory experiments that may be too difficult, expensive, or dangerous to perform in a school environment to complex virtual worlds like those used in airplane flight simulators. CAI tools, such as word processors, spreadsheets, and databases, collect, organize, analyze, and transmit information. They also facilitate communication among students, between students and instructors, and beyond the classroom to distant students, instructors, and experts. CAI systems can be categorized based on who controls the progression of the lesson. Early systems were linear presentations of information and guided drill, and control was directed by the author of the software. In modern systems, and especially with visualization systems and simulated environments, control often rests with the student or with the instructor. This permits information to be reviewed or examined out of sequence. Related material also may be explored. In some group instructional activities, the lesson can progress according to the dynamics of the group.

5. Basic Assumptions of CAI

1) CAI can be arranged for 4000 students simultaneously. It can cope with the problem of quality and quantity in education.
2) One can learn at his own pace, receives immediate and personalized feedback, i.e., completely individualized instruction.
3) In CAI, each learner's performance during the course and on the test is automatically recorded and can be feedback to the teacher so that he may promptly evaluate the learner's performance and use the data in designing the best teaching strategy for the learners in future.
4) It can used in all types of teaching learning programmers. Any lesson in any subject can be programmed for CAI provided that the lesson aerial can be represented in words, picture and experiments to be presented to the students.

CAI system has been used at all levels of education ranging from elementary school to post graduate study and on job training in almost all subjects. Atkinson (1968) designed a programmer for teaching reading to infants. The child first must learn to identify letters. This task of identifying letters is done in three stages of the program–

1) **First Stage –** A model letter appears on the projector connected with a computer, while three letters are presented on the screen. Then the recorded voice instructs the child to look at the letter on the projector. Different letters are shown on the factor. Training is imparted to the child in identifying the letters.
2) **Second Stage -** At this stage, the child masters the identification of single letter. During this phase the child learns to discriminate Pairs of letters.
3) **Third Stage –** During this stage, two, three letters combination are presented on the screen. The child is asked to touch one symbol out of the two combinations which are identical.

6. Various Instructional Modes

In the field of instructions, a computer plays a major role. In these computer assisted instructions, in interacts directly with the learners while presenting lessons. The computer delivers instructions directly to students and permits them to interact with the computer through the lessons programmed in the system. There are various instructional modes which can be facilited by computer assisted instruction (CAI).

1) **Tutorial Mode -** In tutorial information, is presented in small units followed by a questions. The pupils' response is analyzed by the computer and appropriate feedback is given. A network of branches or pathways can be programmed to each. The pupils are allowed to work on their own pace. The more alternative programs available to the computers, the more adaptive the tutorials can be to individual differences.
2) **Drill of practice -** In this mode, the program leads the learner through a series of examples to develop dexterity and fluency in using the skill. All correct responses are reinforced. Only on achieving the mastery by the learner, the computer with proceed further.
3) **Discovery Mode –** Here, inductive approach is followed. The problems are presented and the pupil solves problems through trial and error. It is just like laboratory learning. It aims at the deeper understanding of the results obtained from discovery. Hence, complex problems can be solved.
4) **Gaming Mode –** This mode may or may not be instructional but it is recreational. Sometimes learning takes place through games. This mode is especially meant for young children.
5) **Simulation Mode –** Here the pupil faces scaled down approximation of a real life situations. Hence, realistic practice takes place without involving any risk.
6) **Problem Solving Mode -** problem solving can be readily achieved provided the typical computational capability of the computer is available and there is a typewriter and display response device with remote control of two-way communication. The students need to know how to communicate with computer and how to solve his problem. Hence, the computer assisted or aided instruction may be defined as the use of a computer as an integral part of an instructional system, the learner generally engaging in two-way interaction with the computer via programming. In computer, linear and

branching programmed learning is used. It meets and mid of many student it functions like a super machine. It interacts with the pupils. The computer keeps the record of each pupil's responses. On the basis of these responses it is further decided which information's are to be provided to the students. In case of incurrent response, the computer also hints at correct response. In this way, each pupil is cared and feedback to each and every pupil is provided.

7) **Inquiry Mode** – Inquiry is mode of third type of CAI application. In this CAI system responds to student inquiry with answers it has stored. In this mode instructional staff must learn how the system operates.
8) **Author Mode -** CAI is used to support instruction by generating sets of materials for a student's use. In generating concept learning materials, these might be sentence forms which have blanks in them each of which is to be filled by a word or a set of word, i.e., inserted into the blanks by computer according to the set or instructions.
9) **Logo –** This system was developed by Farseeing and Paper at MIT. Logo is simple programming language which can be taught to children. This programme provides instructions which can be used to produce picture on screen. The children who learn LOGO, make up their own programs to draw flowers of faces or generate designs on the screen. .

7. Advantages and Disadvantages

CAI can dramatically increase a student's access to information. The program can adapt to the abilities and preference of the individual student and increase the amount of personalized instruction a student receives. Many students benefit from the immediate responsiveness of computer interactions and appreciate the self-paced and private learning environment. Moreover, computer-learning experiences often engage the interest of students, motivating them to learn and increasing independence and personal responsibility for education. Although it is difficult to assess the effectiveness of any educational system, numerous studies have reported that. CAI is successful in raising examination scores, improving student attitudes, and lowering the amount of time required to master certain material. While study vary greatly, there is substantial evidence that CAI can enhance learning at all educational levels. In some applications, especially those involving abstract reasoning and problem-solving processes, CAI has not been very effective. Critics claim that poorly designed CAI systems can dehumanize or regiment the educational experience and thereby diminish student interest and motivation. Other disadvantages of CAI stem from the difficulty and expense of implementing and maintaining the necessary computer systems. Some student failures can be traced to inadequate teacher training in CAI systems. Student training in the computer technology may be required as well, and this process can distract from the core educational process. Although much effort has been directed at developing CAI systems that are easy to use and incorporate expert knowledge of teaching and learning, such systems are still far from achieving their full potential. The main advantage of a CAI system are related to the degree to which it permits the individualization of education, particularly instructions –

1. The capability of individualizing both the means and ends of instruction.
2. The capability of doing research -
   i) On teaching under controlled conditions.
   ii) Under conditions which individualize instructions in a particular way.
   iii) On various modes of teaching.
   iv) Ability to collect detailed records of student performance.
3. Permits evaluation of effectiveness of the teaching procedures as well as teaching materials.
4. The capability of developing ways of assisting teachers and authors in the development of instructional materials.
5. The capability of evaluating alternative media used to implement and support instruction.
6. Computer aided instruction (CAI) mean using computers to teach people, it does not mean teaching people to use computer or teaching people about computer technology. Computer can be used in education –
   i) To reinforce present educational system.
   ii) To revolutionize the present educational system.
   iii) To lay the foundations for future system of education to come.

8. Role of Teacher

CAI has proved powerful tool for the teacher in the instructional process. Of course, there is some change in teacher's role as. CAI directly interacts with the students individually and with the teacher. Teachers are to play their role in CAI. Human teachers cannot be eliminated from teaching-learning process. We can highlight the role of a teacher in CAI in the following manner

- **Use of New Tools** : CAI provides the teacher some chance to use new tools. This use will enhance the person's satisfaction. Also it will increase the individual's efficiency. The CAI can compute accurately and rapidly amounts of data. It can produce elaborate graphs and drawings.
- **Compatible with Line Teaching** : CAI is compatible with line teaching. It can be used side by side. CAI is flexible system of instructions. It can very promptly evaluate the performance of individual student. The teacher can devote his time for more creative activities.

9. Limitations of CAI

1. Experts Needed in CAI - Compute aided instructions need the help of the following experts -

i) ***Computer Engineer*** **–** A computer engineer is a technical person and knows about basic principles and techniques of programming.

ii) ***Lesson Writer*** **-** The losson writer is an expert who is familiar with lesson writing. Lesson writers may be experienced teachers or an experienced teacher may be a lesson writer. He knows theories of learning.

iii) ***System Operator*** **–** He knows the system thoroughly andcan cope with all commonly thoroughly and can cope with all commonly occurring failures of software and hardware in the system.

2. The computer fails to appreciate the emotions of students. The emotional climate created by teacher in

direct class room interaction with the students is absent in CAI.

3. CAI programs do not in themselves solve psychological or educational problems. Computer programmes of conventional type do not work like human beings at all.
4. CAI fails to develop essential features of language competency where the ability to generate or construct meaningful sentences is essential.
5. It was pointed out that some students got more tired than conventional study or felt like quitting the study.
6. CAI cannot appreciate the student's artistic endeavor and cannot strengthen his friendship and deepen his pereception of those around him.
7. The peripheral equipment puts constraints in the ways on which a student can interact with the computer.

10. Conclusion

Computer assisted instruction (CAI) has emerged as an effective and efficient media of instruction in the advanced countries of the world. In fact, CAI is being used in formal land non-formal education at all the levels. In India too, computer has been introduced in most of the areas such as data processing decision making. It has also impact on the working methods of research and development in the fields of education.

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