ACTIVITY BASED APPROACH FOR TEACHING ENVIRONMENTAL STUDIES

DR. MANJULA P. RAO
(Programme Co-ordinator)

REGIONAL INSTITUTE OF EDUCATION
(NATIONAL COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING, NEW DELHI)
MYSORE-570 006

May 2000

CONTRIBUTORS

Dr. Manjula P. Rao, Sr. Lecturer in Education, RIE, Mysore

Dr. V. Kesavan, Reader in Chemistry, RIE, Mysore

Dr. B.S. Raghavendra, Reader in Chemistry, RIE, Mysore

Dr. S.S. Raghavan, Reader in Physics, RIE, Mysore

Dr. S.P. Kulkarni, Sr. Lecturer in Zoology, RIE, Mysore

Dr. V.V. Anand, Reader in Botany, RIE, Mysore

RESOURCE PERSONS

Sri. Gopal, Lecturer, DIET, Pondicherry

Sri. Periyasamy, Lecturer, DIET, Krishnagiri

Dr. V. Kesavan, Reader in Chemistry, RIE, Mysore

Dr. B.S. Raghavendra, Reader in Chemistry, RIE, Mysore

Dr. S.S. Raghavan, Reader in Physics, RIE, Mysore

Dr. S.P. Kulkarni, Sr. Lecturer in Zoology, RIE, Mysore

Dr. V.V. Anand, Reader in Botany, RIE, Mysore

PREFACE

The development of activity based teaching in Environmental Studies was enunciated due to the prime need of the hour, where child centered approach should be practised in our classrooms which demands certain essential competencies in teachers to plan and create activities in order to make learning more challenging and interesting.

The material deliberates upon the concept and need for child-centered and activity based approach in the initial sections (1-4). It is emphasised throughout the material about the importance of cognitive skills which have to be developed through teaching science. Some of the useful techniques which develop the process skills are discussed with examples.

The section five is developed by selecting few lessons of environmental studies from class four of Tamil Nadu. The material developed was finalised through a workshop, and a training programme was conducted for the DIET faculty of Tamil Nadu and Pondicherry. The activities developed by the DIET participants is given in the Appendix.

It is intended that this material would help the DIET faculty in training the primary school teachers in the area of activity based teaching-learning in Environmental Studies.

It is hoped that the teachers do not follow activity based approach just for sake of doing it, but with a serious concern of developing certain thinking abilities and essential skills through interesting and explorative activities.

CONTENTS

		PAGE NO.
SECTION 1	- CHILD-CENTERED APPROACH	1
SECTION 2	- NATURE OF ENVIRONMENTAL STUDIES	16
SECTION 3	- DEVELOPMENT OF SKILLS	23
SECTION 4	- USEFUL TECHNIQUES	40
SECTION 5	- LESSONS FROM ENVIRONMENTAL STUDIES WITH ACTIVITIES	64
APPENDIX	- ACTIVITIES DEVELOPED IN ENVIRONMENTAL STUDIES BY DIET PARTICIPANTS	145

SECTION 1

CHILD-CENTERED APPROACH

What is Child-Centered, Activity Based Approach ?

Child centered, activity-based approach means an approach to classroom teaching which is specifically based on the needs, abilities, developmental level, interests and social context of the children for whom it is planned. It places an emphasis on 'learning by doing', 'experiencing' and 'active participation' on the part of the child. The methodology employed therefore, in this approach is largely based on creating a suitable learning environment for the child through planned activities which are joyful and involve active thinking/learning from the child. The role of the teacher is essentially that of a facilitator.

The child-centered approach is thus largely guided by **two basic principles** or assumptions:

- Children create their own knowledge from their experiences and interactions with the world around them.
- Teachers foster children's learning and development best by building on the interests, needs, styles and strengths of the children in the class.

In a teacher-centered classroom

- Children are found as passive learners.
- No activity takes place.

- One cannot be sure whether required learning has taken place in all children.
- The gap between teacher's teaching and children's learning become wider.
- Children lose interest.
- Children become dull and inactive.

Some children may also drop out of the school, as they cannot keep pace with the learning of the others, and also due to inactive environment which is not stimulating.

We learn many ideas from educational theory. Below is a list of statements about children derived from educational theory (these statements are not facts; they are opinions).

1. Children learn best by doing.
2. Children enjoy solving puzzles.
3. Children become bored if a teacher talks continuously for more than 10 minutes.
4. Children live for the present moment.
5. Children's understanding of scientific ideas develops slowly and in a certain sequence.
6. Children see the world from their own point of view.
7. Children learn better through encouragement than through punishment.
8. Every child is unique with his/her own background, learning experiences, interests and needs.
9. Children learn in different ways.

10. Children by nature are explorative, curious and industrious in nature.

We must also keep in mind the different characteristics of children's learning. Keeping these in view there is a need to change our classroom and teaching environment. There is a need to shift from teacher-centered to child-centered approach.

Why is Child-Centered Approach Necessary ?

Usually in a typical primary classroom we see a teacher standing at the blackboard, chalk in hand, either explaining, something drawn/written, or getting the children to read one by one from the textbook. Or s/he may be writing something on the blackboard and asking the children to copy on their slates or note-books. We find the children as passive listeners, or mechanically reading or writing something. There is very little 'active learning' or no 'active learning' at all takes place where teacher plays a dominant role.

Such classroom situation is very teacher-centered, i.e. the control over time, pace and nature of the classroom activities is totally in the hands of the teacher. The teacher's main aim is to complete the lesson/syllabus and there is little focus on how many children have really learnt. Because a teacher teaching a lesson does not necessarily mean all children have learnt ! The teacher therefore has to plan a variety of experiences or activities for the children. Similarly, the fact that children learn in a spiral and not in a linear way makes it necessary to give opportunities to children, through activities and materials, to come back to or revise concepts already introduced earlier and again for a deeper understanding.

While the characteristics are common to most children the teacher has to also keep in mind the specific group of children she is teaching in terms of their social and cultural background, their immediate environment, the learning and experiences already with them when they come into the class, their language background, and other such aspects which would also determine the kinds of activities/experiences she will plan for them. To this extent it is believed that very classroom is unique in its character and therefore what may work with one group children, or with one teacher, may not necessarily work with another ! The importance of developing this sensitivity in teachers cannot therefore be overemphasised.

In a child-centered classroom

- the child and not the teacher is the focus of the entire process of teaching-learning.
- the child is not a passive but an active participant in the classroom process.
- the child gets maximum opportunities for interaction with:
  - other children in the class,
  - with the teacher and
  - with a variety of teaching-learning material
- the curriculum and the instructional materials serve as a means to foster the child's all round development and are not ends in themselves.
- the goal of teaching-learning is not merely helping children acquire knowledge but promoting all round development of personality.

- activities planned by teachers and carried out by children become the medium of learning for the child rather than only the textbooks.
- evaluation of the child is done as an important part of the learning cycle to ensure child's progress and not as a means of passing judgement on the child's abilities.
- the teacher's aim while teaching is not so much to cover the syllabus but to ensure that all children in the class are learning.
- the environment in the class is warm, joyful, encouraging in which children feel secure and confident and participate freely and without any fear.
- variety of activities/opportunities are available in the classroom which enable each child to learn at her/his own pace and in tune with her/his own learning style.
- the teacher is a fried and a facilitator for the children and allows the centre of action to shift in the class from himself/herself to the children.

How Children Learn

While children at different stages have different needs, abilities and interests which need to be kept in mind while planning learning experiences for them, it is also important to know how children actually learn. It becomes necessary also in view of the fact that, as we all know, there is a wide gap between what is 'taught' by the teacher and what is actually 'learned' by the children. Under- standing how they learn will help reduce this gap and enhance children's learning. Let us consider what are the ways in which children learn better:

- Children come to school not as an empty slate but with a fund of experiences already with her/him. This may vary from child to child both in terms of quantity and quality. The learning experiences planned must take these into account. Also, their diverse experiences and knowledge levels at the time of coming into school, must be acknowledged and respected to give them confidence and a sense of self-esteem.
- Children's learning is not limited to the school. It is a continuous process taking place all the time and every- where, at home, in the class and even on the playground.
- Children learns not only from the teacher but also from interacting with other children and materials and therefore needs opportunities for this interaction.
- Children learn through their senses. Opportunities for sensory stimulation (smell, touch, taste, hearing and vision) and activities involving more than one sense will help children learn better.
- Children learn at their own pace. All children cannot be expected to learn at a uniform speed. Flexibility is therefore very important in providing learning time as well as in setting expectations from children.
- Children learn in a holistic way and not in a segmented or compartmentalised way. Learning would therefore be more meaningful for a child through an integrated approach rather than through teaching of each subject separately.

- Children do not learn in a linear way. They learn instead in a spiral way. For example, children may be taught addition of single digit numbers in grade 1 after having learnt numbers. But their learning would be better if they are given the opportunity to come back to these concepts and skills again in the later grades along with the new learning so that this learning gets consolidated.
- Children's learning proceeds from concrete to abstract, from familiar to unfamiliar and from specific to general. Learning experiences for children therefore need to be planned keeping these principles in mind.
- Children need to experience success more often than failure to encourage them on to work hard and achieve. It is important, therefore, to plan tasks for them which provide a challenge but are well within the limits of their abilities.
- Children also learn better if they are encouraged and reinforced. Not only do they learn better but also get motivated to learn more, if they receive encouragement, appreciation and opportunities.
- Children learn easily when the content is interesting, captivating, and relevant to the child's immediate environment.
- Children's learning is more effective if the teaching- learning process is joyful and activity-based and allows for active participation and thinking at their level.

An important feature of the primary school years is an advance in children's ability to gain knowledge about themselves and their environment.

During this period they come to rely increasingly upon the mental manipulations of concepts in adapting to their world. They become more adept at processing information; in other words, their reasoning abilities become progressively more rational and logical. The characteristic features of children's cognitive development during the primary school years are given below.

- Attention span becomes longer and the child cannot only sit but also concentrate for a longer time now.
- Concrete operations: Ability to think and reason logically develops but is still limited to concrete situations. Abstract thinking is still difficult. For example, mathematics concepts are understood well if introduced through actual objects and experiences rather than through symbols on the blackboard or in the textbook. The children are bound by immediate physical reality and cannot transcend to remote, future or hypothetical matters.
- Children can understand that properties like 'quantity', 'weight' or 'number of objects' does not get altered if the shape or spatial arrangement is changed.
- When five match sticks are given confidently the child can tell that the number remains the same even if one arrangement covers a larger area. In other words the child now has the ability to conserve. This is an important development which equips children to learn mental operations such as addition, subtraction, multiplication and division. The children can now understand that these processes are 'reversible', i.e. subtraction and addition are opposite or reverse of each other.

- Can candle more than one concept at a time. Can now classify objects in many ways on the basis of different properties, eg. colour, shape, size, texture, function, etc. Eg: Classification of colour beads/type of beads (wooden/plastic).

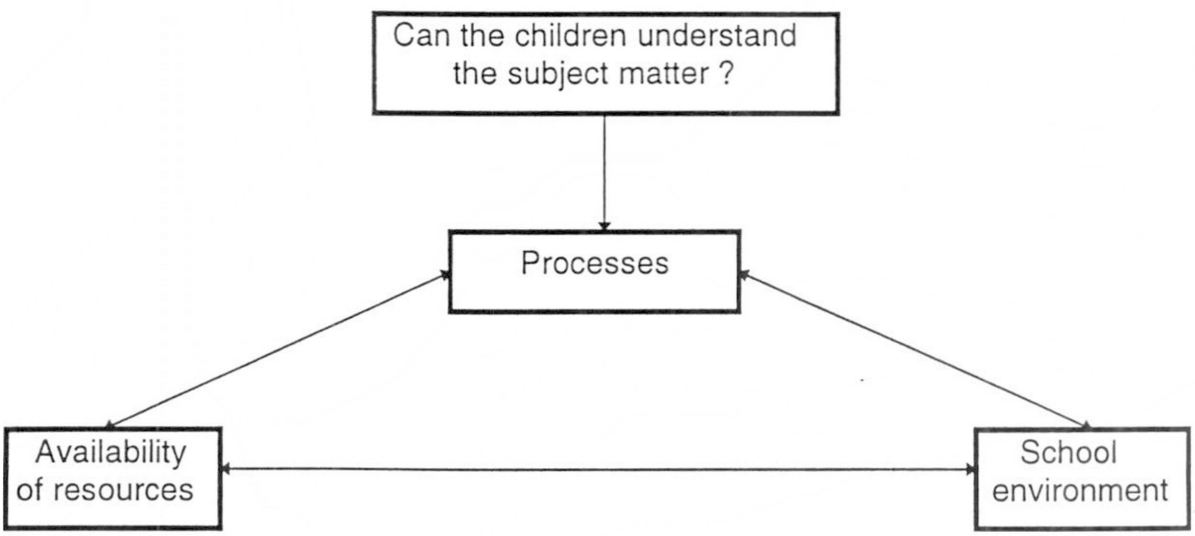
- By this stage children develop the capacity to see other's point of view and respond to it appropriately. Children are also able to move from personal experiences to general principles, i.e. the child can relate his/her own experience meaningfully to a situation encountered or being discussed. This development is a major step forward which helps the children analyse, understand and see logical relationships.
- Develop important language skills like listening, speaking, reading and writing with understanding provided right opportunities, experiences and encouragement are available.

- Continue to respond spontaneously to music and rhythm. Enjoy songs and poems. Can pay more attention now to the words and their meaning.
- Love to play too but the nature of play becomes more mature, more organised and structured leading towards a planned outcome, eg. playing regular indoor and outdoor games with rules such as seven tiles, cricket, throw-ball, football, hockey, kho-kho, marbles, gittis, snakes and ladders, ludo, etc.

- **Seriation**: Children acquire the ability to order objects in a series according to size, weight or brightness. They can recognise that one element can stand in two different relations at the same time.
- Continue to be curious unless discouraged at the earlier stage. Need a stimulating environment to nurture the curiosity.

- Continue to enjoy exploring the environment. Can now experiment and solve simple problems using logical skills and feel a sense of achievement/ competence in doing so.
- Can successfully plan and organise activities leading to specific outcomes, along with other children, with only a little guidance from the teacher.

Before planning any kind of teaching-learning activities a few points have to be considered like.



In order to implement the child-centered approach in the classroom it is necessary to consider a few prerequisites required on the part of teacher. They are

- Planning
- Teaching Strategies
- Classroom Organisation and Management
- Teaching-Learning Material

Planning

A child-centered classroom requires certain goals and careful and systematic planning. The planning is to be done keeping in mind the following:

- the specific objectives of the curriculum and expected learning outcomes for the different learning areas
- resources available in terms of both financial and material
- teaching-learning time available
- developmental stage, background and entry level learning of the children to be taught

A good programme requires both long-term and short-term planning.

Long-term planning means annual planning or planning broadly for the whole year by listing out the learning areas to be covered. These can then be further broken down into term-wise and then month-wise planning units.

Short-term planning is based on these long term plans and requires more detailed plans for the fortnight or week based on which the daily plan is worked out.

The Daily Plan

The daily plan must be worked out keeping in mind some basic principles of planning. The daily schedule must have a balance of:

- activities for the different curricular areas in proportion to the ratio of time prescribed for each area.
- large group, small group, paired and individual activities.
- outdoor and indoor activities.

- integration of activities - Experiments followed by discussion, field visit followed by discussion, certain indoor activities, listening to a audio followed by group work.
- guided and open-ended or creative activities.
- activities for new learning/revision and continued assessment.

While planning the following factors should be considered

- Quality of the programme
- Flexibility to allow for necessary changes
- Essential learning outcomes to be attained
- Background (age, level, language, comprehensibility and other factors)

Teaching-Learning Strategies

The advantages of the activity based method are that through this method children

- get opportunity to learn, not by rote but by doing and experiencing, which leads to better understanding.
- get opportunity to practice skills, eg. doing activities in EVS in joyful way which ensures not only development of skills but also development of interest and motivation to use the skills.
- get opportunity to learn at their own pace and according to their own style of learning.
- get opportunity to experiment, discover, create and construct their own knowledge.
- develop a more sustained interest in learning.

- get opportunity to strengthen their learning.

Teaching-Learning Materials

- how far its language is suitable for child for whom it is meant.
- how far the content is relevant for the child and within the child's level of comprehension.
- how far it promotes activity based learning through the content and exercises suggested.
- how far does it create interest and motivation in the child to read it and learn more about what is read.
- how far it develops process skills required.
- how far it generates scientific curiosity in knowing certain things.
- how far it develops application skills.
- how far it develops certain non-cognitive outcomes.

Classroom Organisation

The kind of classroom climate created by the teacher has a lot to do with how much the children will gain from this approach. Organising and managing of the classroom therefore becomes an important area which needs attention. Let us first consider what are the requirements of an activity-based or child-friendly classroom. A child- friendly, activity-based classroom requires:

- a flexible class arrangement to allow for change from large group to small group activities or from quiet to more energetic activities.
- an arrangement which makes interaction and communication among children easier to enable them to learn from/with each other.

- an arrangement which provides opportunity to children to choose their activities and areas of interest.
- a classroom in which every child can find something of his/her own which s/he can identify with and thus feel proud to be a part of the class.
- an arrangement which allows scope for children to work at their own pace and according to their own style.

Flexibility in seating arrangement is required according to the tasks involved. For convenience, children should be made to sit in groups on the clean ground whenever group activity is involved. They should be allowed freedom to move around freely in the classroom. So the arrangement should be made in such a manner which allows for this flexibility and freedom. Activity corners where children can set up their experiments should be provided in the classroom. Along with this, certain display corners should be there in a classroom where children can display whatever the items they have collected according to the tasks involved. The classroom should be made attractive and inspiring by displaying children's work (eg. charts, models, and drawings) and placing the other kinds of work on the benches put on the sides. Teacher should have enough space to move around to the different groups to supervise and guide the work of children.

SECTION 2

NATURE OF ENVIRONMENTAL STUDIES

Background

Environmental studies is not a new subject in our school curriculum. It had been under varied names as general knowledge social studies, general science, nature study, citizenship for the young and such others. It was even equated to liberal education. It was also viewed, by some, that the Environmental Studies made a unique contribution to liberal education. Considering the term 'Environmental' it has been used Eulogistically to describe a very wide range of educational activities. While talking of Environmental Studies, atleast five overlapping but different senses may be distinguished.

1. The whole experience of the child,
2. The character of the school,
3. The features of the classroom and the school used in the active learning,
4. The social and physical characteristics of the child's home, neighbourhood and the wider world and
5. Features of the neighbourhood and natural surroundings used in teaching.

John Dewey viewed environment as consisting of those conditions that promote or hinder, stimulate or inhibit the characteristic activities of the living being. Considering, the above point, Environmental Studies forms a bridge between the school environment and that of the home and community outside; where, the child can test the relevance of his classroom experience to the world,

in which he will use it and at the same time accustom himself to employing in society those interests and skills which he had learnt.

Progressivists viewed that exploration of the environment was an itself a satisfying experience for children. They differed from the traditionalists who had seen field studies as a low academic standards. The progressivists' approach to Environmental Studies was through an emphasis on field work and project studies, where the child is actively involved in the process. Thus, the evolution of the concept of Environmental Studies has led to the present conceptual framework; where, Environmental Studies is seen as both natural and social environment (aspects).

Conceptual Framework (Present)

Of late, two new perceptions of Environmental Studies have acquired particular importance. 1. There is a growing concern for environment demanding proper awareness about the problems and consequentially of conservation measures. 2. Environment is given much a broader meaning that covers both natural vis-a-vis human aspects and thus pointing out to the social origins of environmental configurations. Apart from these, there is a growing realisation that the Environmental Studies should be seen as an integrated curriculum approach at the early school stage. The fabric of Environmental Studies by its very nature is a network of interactive linkages and accordingly the human being and his socio-natural environment have to be viewed at certain levels of generalities and specifities within the range of visualisation of the learner.

The primary aim of Environmental Studies is to help the child to understand the processes which shape his surroundings so that he does not remain as a passive spectator to natural and social environment around him, but becomes an informed and active mediator of his environment. It provides distinctive opportunities for the development and exercise of the general cognitive abilities. Environmental Studies not only aims at developing awareness of the child to the various features of his immediate environment but also enables him to use his own environment as a source of stimulus to learning. It is based on child's organised investigation of his own natural or physical surroundings and learning revolves around the study of environment. In other words, environment becomes a stimulus to learning and learning is directed to the study of environment. Environmental Studies infact has an educational advantage in the sense that it develops certain process skills. In general terms, here is a situation -- that is what means can we use to record it ? What techniques are necessary to analyse it ? What information would contribute to understanding it ? How is the situation developing ? How could we contribute to that development ? If we had the opportunity, how can we communicate the results of our enquiry ? and so on. Therefore, Environmental Studies is not a content area but an approach to learning. The basic idea here is, to teach the information gathering skills rather than imparting scientific facts. It emphasises upon tapping the immediate surroundings which forms a seat of learning. It focuses upon the direct experiences of the child. It provides themes in which the relevant scientific principles are sought and elaborated. Thus, Environmental

Studies constitutes an approach "learning how to learn", wherein training is acquired in the methods of self learning. Environmental Studies also educate young child to be better equipped to face ever-changing environment in his future life.

Environmental Studies in School Curriculum

Environmental Studies curriculum is organised in two different ways at the primary stage: (1) in one approach Environmental Studies is divided into two separate curricular subsections, i.e. Social Studies and science usually referred to as Environmental Studies part 1 and 2. However, in the first two standards a holistic approach is maintained based on the view that it is too early to expose the child to separate disciplines as science and social studies. (2) There is another approach, where some people consider that it is worthwhile to postpone the split approach till class 5. This view is held because, a formalised division would hamper correlated teaching and operation of concepts and field of experience. Under such an approach the units of study are so identified that the content of each unit is homogeneous. There are two more issues pertaining to Environmental Studies: one pertains to national goals and aspirations to be cultivated through the teaching of Environmental Studies, such as democracy, secularism, socialism, scientific temper, etc., the other issue is related to local specificness that is reflected in the Environmental Studies curriculum. When so many changes are taking place, especially in the areas of Science and Technology and the socio-economic and cultural scenario, Environmental

Studies is the only major area of primary school curriculum which has to reflect them.

These considerations can be met through appropriate teaching-learning strategies, techniques and devices including text books and other curricular materials. A teacher education programme should provide for proper awareness of these requirements and development of skills for accomplishing the tasks. Teacher preparation efforts for Environmental Studies are very complicated ones requiring necessary awareness, competencies, good deal of open mindedness, flexibility and ingenuity. It is desirable that the teacher follows learner centred, activity based and problem solving oriented teaching-learning strategies. He/she should act more as an activity facilitator, co- investigator, co-learner, and a guide to identify the learning resources and not merely a communicator and the disseminator of knowledge related to Environmental Studies. The teacher has to employ the methods to develop the process skills like, formulating hypotheses, to ask questions, to experiment with new idea, to stimulate creative thinking and solve problems. The teacher has also to employ the principles of psychology in understanding the non-cognitive dimensions of the child's needs. He/she has to be apt in providing guidance and counselling after assessing the child's problems.

On the whole, the Environmental Studies can be viewed as an approach to the learning of natural and social environment without being burdened by any disciplinary considerations. Though it deduces from a philosophical conception, it is an apparatus of physical activity, personal discovery, the evolution of

knowledge through activity with teacher as a guide, and integration of subjects. Ontologically, Environmental Studies builds up certain inherent values like, self reliance, self confidence, social development, learning of social roles, development of group spirit of comradeship in an out of school situation.

Environmental Studies II

The National Policy of Education, 1986 has enunciated that minimum levels of learning be identified for each stage of education which led to defining the specific behaviours what children should attain at the end of every stage of education. The areas listed in minimum levels of learning related to environmental studies are

- awareness about one's well being in the context of social and natural environment.
- awareness about preservation of good health.
- skill in gathering and classifying information about living things from one's own environment and drawing simple inferences.
- observation of some common characteristics of non-living things, and simple phenomena related to earth and sky.

The above major areas were subdivided into sub-areas, and each sub-area into several competencies and sub- competencies which would enable teachers to organise activities and tools for evaluation.

For the effective learning of environmental studies, as suggested earlier, a learner-centered, activity based and competency based approaches are required

which encourage the enquiry, experimental, discovery skills, inductive learning, problem solving, logical and creative thinking in children.

This training material includes the activities related to Environmental Studies II aiming at not only fostering learning, but to develop the cognitive skills that are essential. It is aimed to guide the teachers in understanding the children's characteristics, the ways in which they learn in order to select the activities suitably that would help in constructive learning.

SECTION 3

DEVELOPMENT OF SKILLS

Development of skills through environmental studies -

Science

The following skills can be developed through teaching environmental studies (Science) in children.

1. Observation
2. Communication
3. Counting number relationships
4. Measurement
5. Experimenting
6. Using space/time relationships
7. Classification
8. Making hypotheses
9. Inference
10. Prediction
11. Controlling and manipulating variables
12. Interpreting data

1. Observation

This is a fundamental scientific skill. Observation is more than just 'seeing', we have to select out what is important from what is unimportant, which requires practice. Children see many things, but may not always observe. For example,

they may 'see' many birds everyday. But do they observe them ? Do they observe that some birds are alike; that some are different ? Do they observe that some birds fly by flapping their wings quickly, while others glide ? All senses are involved in observation (seeing, hearing, feeling, tasting, smelling).

In environmental studies (science) you can create lots of scope for children to learn through observation. For example, you can take them around the school. You could go on a 'looking' walk, a 'listening' walk, a 'touching' walk. You can ask children to look at the plants around - the type of plants - short and tall; creepers, trees, and shrubs; the type of leaves and flowers they bear and so on. You could ask them to listen very carefully to all the sounds outside - the wind, birds, dogs, goats, insects, radios, people talking, music, bicycles and so on.

Teachers' Role

- Children should be encouraged to look very carefully at things.
- They should be asked to record their observation in a note book.
- Have them tell you in the class what they observed.
- Give importance to their observations, even if they are trivial, and not relevant to the task at hand. But direct their attention to what actually should have been observed.
- Note what they have learnt through their observation. Discuss the details or underlying principles later.

2. Communication

The children should be able to say clearly what they have observed or discovered. Sometimes they can be asked to write down, or share with others, or draw a diagram, make a model and so on. The skill of communication is involved in all these cases. Children should learn this skill as most activities in science involve this process. In case of younger children where long descriptions of what they have seen or done is not possible, it is important to encourage other methods of communication, i.e. drawing pictures, making paper models, etc. with older children, one should encourage the ability to describe an experiment, or write details of experiment in their own words.

3. Counting number relationships

In science we often have to count separate subjects. Children can apply their knowledge of counting in mathematics to science, because it is often necessary to record our counting number, observations, objects like seeds, stones, flowers, number of petals in each, pods, etc. can be easily counted.

4. Measurement

In science, we often need to compare things, size of objects, areas, speeds, weights, temperatures, volumes and so on. Measurement is concerned with these kinds of comparisons. The materials like water, sand, and clay may be used to develop children's understanding of measurement.

5. Experimenting

To experiment means to test, usually by practical investigation. Children often experiment in a trial and error way. But as they grow older, they learn to

think more carefully about their ideas before they do the experiment. You can encourage children to explore knowledge through activities conducted by themselves. Ask several questions of thought provoking, so that it would set them to thinking and acting. Provide facilities and infrastructure in the classrooms, so that children can involve themselves in activities and learn through their own experience.

6. Using Space/Time Relationships

Children's ideas of space and time have to be developed particularly.

- the ability to recognise shapes.
- the ability to use directions such as up, down, forward, back, right, left.
- learning how to space objects according to a plan.
- using a grid.
- fitting objects inside other objects.
- describing directions and distances.

In using time relationships, the following skills will be developed.

- learning to put events in order.
- making simple clocks.
- using units of time such as the minute, the week, the month, the year.
- telling the time.
- timing the events.

7. Classification

In our everyday life, we need to recognise the similarities and differences between objects. We sort and arrange them according to their similarities and

differences. We learn to recognise their properties. So **recognition of properties and ordering** are skills which we can group together under the process of classification. It is important for children to understand that we classify things for a purpose. For example,

1. Classification of objects
2. Classification of plants
3. Classification of animals
4. Classification of man made and natural things.

First, children need to recognise properties of objects, eg. colour, size, shape, texture, and smell. In this way, they can learn the similarities and differences between objects. Later they can learn to classify living things and non-living things, eg. solid/liquid/gas, collection of leaves which can be classified by shape or size. Animals too can be classified: by size, number of legs, presence of feelers and so on. The main point is that children should be encouraged to look carefully at their properties, their similarities and differences.

8. Formulating Hypotheses

A hypothesis is a reasonable guess to explain a particular event or observation. In practice, a scientist usually makes a hypothesis which he can test by means of an experiment.

Example: A potted plant goes dry after sometime. What could be the reason ? Ask students to make as many hypotheses as they can to explain the observation. For each hypothesis, ask them to verify. For example,

Question: Why do you think the plant went dry ?

Hypothesis by Child 1: It is not watered.

Hypothesis by Child 2: It is not kept in the sunlight.

Hypothesis by Child 3: The soil is not good.

In each case, the child should be asked to verify the hypothesis by testing, and by planning some experiments that can be carried out to test the hypotheses. Problem solving involves making a hypothesis which can be tested. The teacher can begin the environmental studies class with a problem. Here are some ideas which might encourage children to make hypotheses.

- How do you think a plant loses water ?
- Why do you think the torch does not light ?
- Why we cannot see stars during the day time ?
- Why do you think that iron gets rusted ?

The children should be asked to suggest an explanation in each case - not to state a fact. Children should be encouraged to make as many hypotheses as possible, and try their hypotheses by experiment.

9.Inference

When we wanted to find out about a thing stolen, we look for certain clues to know who has stolen. When we have gathered as many clues as possible, we come to a probable conclusion about the person who has stolen the thing. This is an **inference**. A scientist works in the same way.

- He gathers as much information as possible.
- Often he has to experiment to gather his information.
- He then thinks critically about his information.

- He does not make a blind guess.
- He makes an inference which fits all the information he has at the time.
- It may not be his final inference but it is acceptable for the moment.

It is important not to confuse an observation with an inference.

- Which of the two birds (giving examples) lives in water ? Why do you give your answer ? Are you making an observation or an inference ?
- Which of the two birds (giving examples) have claws on its feet ? Is this an observation or an inference ?
- Which of the two birds is a bird of prey ? Is this an observation or an inference ?

You could begin by helping them to understand the difference between an observation and an inference.

You can play inference 'games' with children. For example, you could go on a walk around your village or town, and collect some objects. Bring them to school, show them to your children, and ask them to infer where you went. Play a game like this. Say to the children: 'I am thinking of an animal', Put up on the board some observations about the animal. Then let the children make an inference which fits these observations:

	Observations	Inferences
A.	It eats grass. It is smaller than an elephant. It is brown	I think it is a cow
B.	It is brightly coloured. It has three parts of legs. It's name begins with 'B'.	It think it is butterfly

You can modify the game as you please. Let the children play it in groups.

Cartoon strips often appear in newspapers or magazines. Find one which tells a story in a few pictures. Cut up the strip into separate pictures, and muddle up the order. Put them on the discovery table and challenge the children to put them in the correct order. To do this, the children have to look carefully at the pictures first. The pictures contain clues about the order of the story. Puzzle boxes of all kinds make good teaching materials for inference. With puzzle boxes, children have to make observations about the box before they make an inference.

10 Prediction

Meaning: The scientist will be able to foretell (or predict) events in the future. To do this, he uses his present observations or measurements. This is the first step towards our understanding and control of our environment. We have to be reasonably certain to make a prediction. This means that we have to base our prediction on consistent (regular) results.

Every day we make predictions about events in our own lives, based on our previous experience. But the scientist often wants to take the process of prediction further than this. Let us take an example. The population of the world is increasing very rapidly. We could plot this increase on a graph.

Predicting appears very early in science teaching. For example, a child might experiment with batteries and bulbs. He discovers how to make a bulb light with one battery. He then discovers that if he adds another battery the bulb is

brighter. He might then predict that if he adds a third battery, the bulb will be even brighter.

You could drop a ball from certain heights. See how far it bounces. From this, children can make certain predictions. You need a piece of newsprint (or similar paper). The zero line is at the base of the paper, and the other lines equally spaced at a distance of, say, 20 cm from each other. You will also need a tennis, ping-pong or rubber ball.

Drop (don't throw) the ball from the '6' line. Ask the children to watch how it bounces. Can they see the point it bounces back to ? Perhaps it goes up nearly to the '3' line. Make sure that they bounce the ball on to a reasonably smooth, hard part of your concrete floor.

After discussion, you can record the drop and re- bound heights on the chart with a crayon. Repeat the experiment dropping the ball from different heights. It is important to repeat the experiment several times to check the rebound heights. As you can see, the ball is rebounding to half the drop height.

Now you can ask for a prediction. How far will the ball rebound if dropped from the '5' line ? Record the children's suggestions in pencil on the chart. Then test their predictions by dropping the ball from the '5' line. Were their predictions reasonable ?

Let them try the activity. Let them use different balls, and, in each case, make predictions on the basis of their observations.

Growth in plants can also be used as a prediction activity. For this, you will need some small growing maize plants. You can sow seeds in a pot or tin in the

classroom. Or you can use maize seedlings growing in the school garden. Children measure the height of the growing seedlings with a strip of paper (or a simple ruler). They then plot the height on a graph like Fig. 1. The dotted line after the twelfth day helps us to predict the height of the maize plant on future days. The children could make a table like Fig. 2. In the third line of the table, you can ask the children to write in their predictions before they actually measure the height.

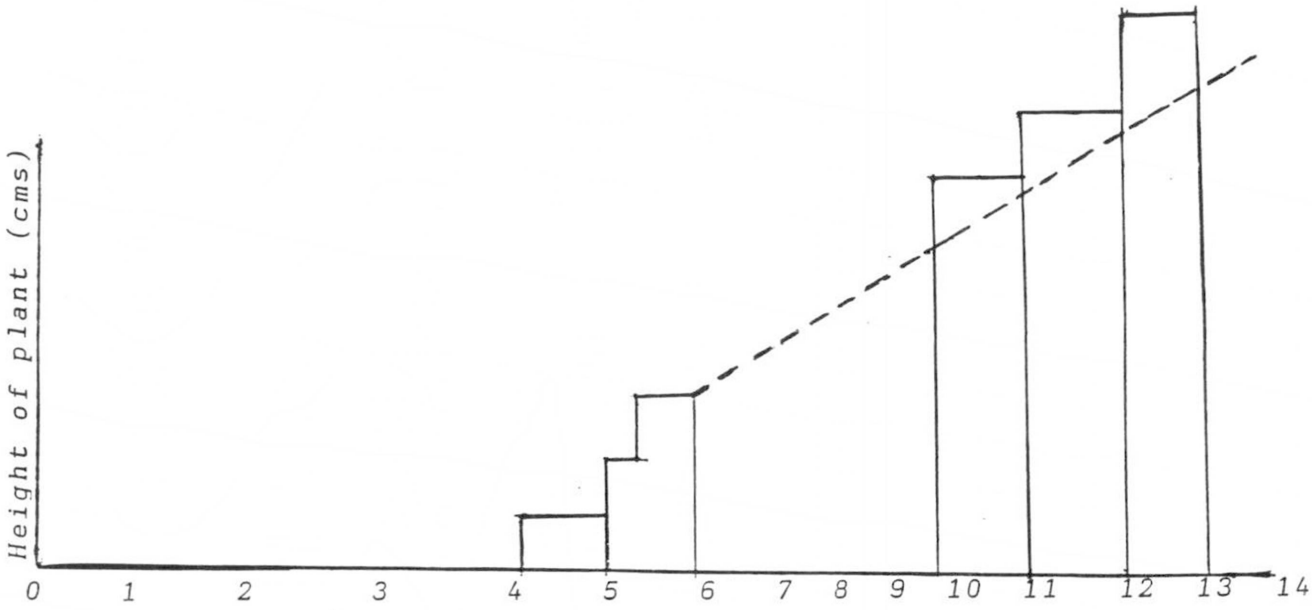


FIG. 1

Fig. 2

Number of days after planting	5	6	7	8	9	10	11	12	13	14
Height of our plant	about 1 cm	about 2 cm	about 3-4 cm	about 6 cm	about 7-8 cm	about 10 cm				
Height we expect							between 11-12 cm			

Pupils can make similar predictions charts about rainfall and temperature. They can also investigate what happens when jars of different size are placed over burning candles. Can they make predictions about how long the candles will burn ?

11. Controlling and manipulating variables

Meaning: A farmer (Mr X) grows a crop of guinea-corn (sorghum). It grows very well and he gets a lot of corn at harvest time. His neighbour, another farmer (Mr Y) also grows guinea corn, but gets a very poor yield. Can you think of any hypotheses to explain this situation ? Clearly, there are a number of factors which might affect the growth of guinea corn. A scientist would call these factors as **variables**. For example, in the situation above, we might ask the following questions:

- Did Mr X add fertiliser to his soil ?
- Did Mr Y use the wrong fertiliser ?
- Did one of the farmers water his crop ?
- Did the farmers use different spacing distances when they planted their seeds ?
- Were the soils different ?
- Did the farmers use different varieties of seed ?
- Were the seeds planted at different times ?

All these variables might affect the growth of the plants, and therefore the yield of the crop. We can investigate the effect of these variables in a scientific way.

First, we must remember that, to do this, we have to make comparisons. It is no good growing another crop of guinea-corn on farmer Y's land, and just adding fertiliser. We must also grow a crop to which we do not add fertiliser. Then we can make a comparison between the two crops. This second crop is called a control. Controls are very important in agricultural and biological experiments where a number of variables are involved. Consider the example given. If a control is not done, the increase in yield of the fertilised crop may be due to some other factor - not the fertiliser. A control allows us to make a reasonable comparison. We might discover from the farmers that:

- whether they watered their crops
- they planted their seeds at the same distance from each other
- they planted their seeds at the same time

The farmers are next to each other so we might assume that the soils are similar. However, Mr X used improved seed and fertiliser.

Mr Y used seed from his previous crop and no fertiliser. Here, we have a testable hypothesis:

Mr. X obtained a greater yield of maize because he used improved seed and the correct fertiliser.

Now we could test this hypothesis. We could set up four similar sized plots:

1. Unimproved seed and no fertiliser
2. Unimproved seed and correct fertiliser
3. Improved seed and no fertiliser

4. Improved seed and correct fertiliser

We could measure the yield from each of these four plots and record the results in a table like this. Some imaginary figures are given:

	Yield with correct fertiliser	Yield with no fertiliser
Improved seed	2.5 kg	1.5 kg
Unimproved seed	2.0 kg	1.1 kg

From these figures, we might infer that the best yield is obtained when improved seed and fertiliser is used. However, to be sure of our results, we would need to repeat our experiment several times. Agricultural scientists always repeat their experiments many times. They investigate many different variables, and do their experiments in different places.

In many biological experiments, this process is very important because so many variables are involved, for example,

1. Try growing seedlings: * in the dark

   * in the light

   What happens ?

2. Put young plants near the window of a classroom. What happens ? Think about the results and suggest a possible control.

3. Leave some old bread for a few days. Does a mould appear ? Try the experiment again altering some variables, for example.

   * make the bread wet

   * keep some in the dark

   * cover some with a bottle or tin

* keep some in the sun

Do these variables affect the kind of mould produced, or the rate at which it appears ?

12. Interpreting data

Interpreting data in a very simple way can be done with younger primary school children. For example, let us say that they make a matchbox histogram to show the number of boys and girls in the class. This histogram has to be interpreted. Children might be able to say for example:

- There are more boys in the class than girls
- There are twenty-three boys and sixteen girls
- There are seven more boys than girls

However, usually this process will appear more often with older primary children. When you do a demonstration, or they do an experiment, interpreting data may be involved. If data has been obtained, you should always spend some time interpreting it.

Here are some ideas for collecting suitable data:

1. Measure children's heights. Plot a histogram. Find from this histogram the average height; the most common height; the tallest and shortest heights; the number of children between certain heights.
2. Burn a candle under a jar. Measure the time taken for the candle to go out. Repeat the experiment several times (say, ten times). Record in a table the time taken for the candle to go out. This time will vary for each repeat of the

experiment. Plot the results on a histogram. What does this histogram suggest ?

3. If you have a thermometer, observe the temperature at noon each day of the week. Record the results in a table:

Day	Temperature at noon in °C
Monday	
Tuesday	
Wednesday	
Thursday	
Friday	

- What was the average temperature ?
- What was the hottest day ?
- What was the coldest day ?

You should now have an idea of what we mean by a 'process' approach. There are some important points we should remember about this way of teaching science.

1. Most of your science lessons will develop several of these processes. You cannot teach one skill without teaching others. For example: children do a measurement activity. They will also learn about communication. (Perhaps they make a histogram). They may then interpret the data they have collected. Perhaps the histogram allows them to make certain predictions.

Thus, although your science lesson may concentrate on one particular process, other processes will occur. When preparing you lesson, think about this

problem. Try to identify the processes which will arise, and stress them in your lesson.

2. Your official 'syllabus' may list topics or content which you have to teach. You can still use a process approach if you use a little imagination. Let us consider as an example the topic of water. Water can be a wonderful resource for teaching processes:

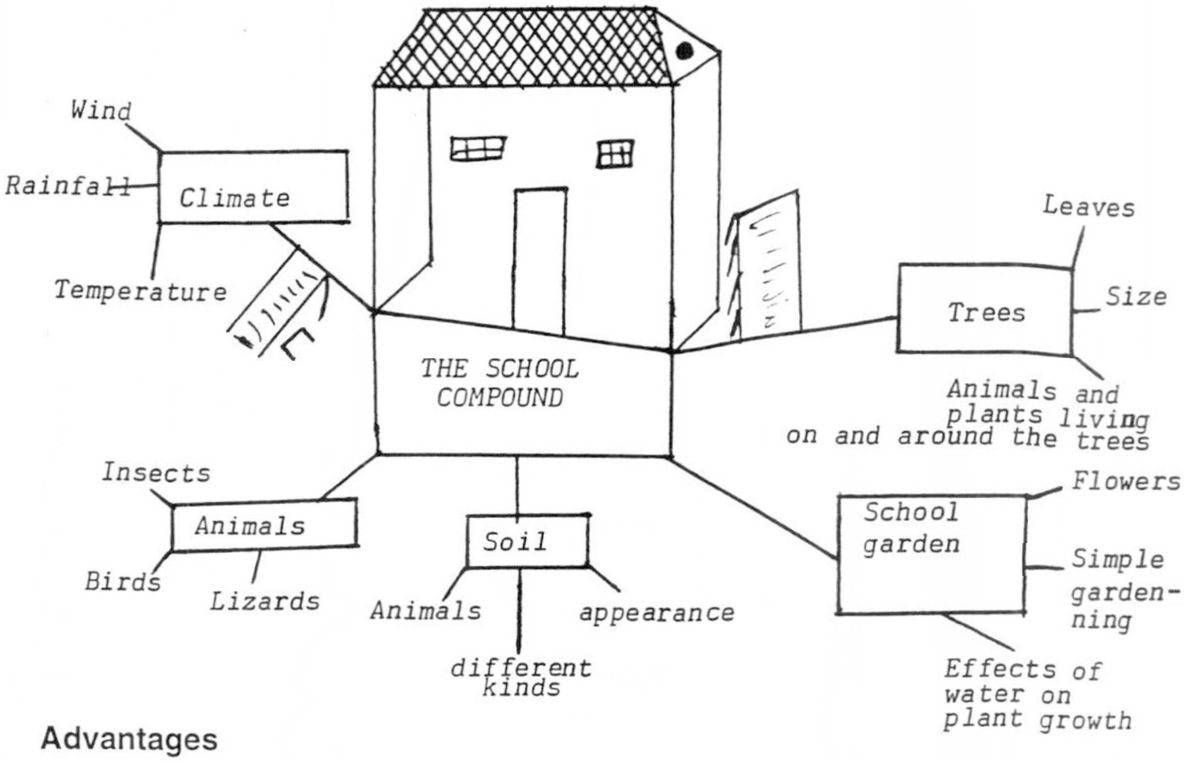
- Sink and float activities develop observation, communication, counting number
- Water can be used in pre-measurement activities, eg. in simple conservation exercises
- The effect of water as a variable affecting seed growth can be investigated
- Water can be used to make simple clocks (space/time relationships)

Thus, you can use your syllabus in a flexible way. This will be much easier if you want to develop certain skills in your children through teaching science.

The project approach

Here, the teacher or the children select a project. They might choose 'the school compound'. All the various aspects of the school compound are then considered. We might show this as a diagram (Fig. 3). Thus one topic leads to the next according to the children's interest. For example, a study of trees might lead to leaves, or measuring the height of trees. Climate may lead on to a study of rainfall patterns ... and so on.

FIG. 3



Advantages

a. The approach tends to be child-centred. This means that the child's natural interests are follows. For example, he may find animals on the tree he is studying. This might take his interests in a new direction.

b. It is argued that because he follows his own interests, he will learn better.

c. The approach allows easy integration with other subjects.

SECTION 4

USEFUL TECHNIQUES

Some of the useful techniques of teaching science at primary level through which certain cognitive skills can be developed besides the acquisition of science concepts are discussed in this section.

Most people like a good story. Children especially like stories. When you tell a story, you are communicating. Telling a story is a good way of catching children's attention. But it is important to use a story to maximum effect. Here are some points to remember:

- Make sure that the story has a scientific message which the children can understand. It should be relevant to the rest of your lesson.
- If the story has been made up by someone else, make sure that you understand the point of it. Practise telling the story by yourself before the lesson.
- Make sure that the children are comfortable and can see you.
- Tell the story in the local language. It is not worth telling a story unless the children understand it. If you have to use English (or another language) tell the story slowly. Ask questions as you go along to check that the children are understanding.
- If it helps, make a chart or charts to illustrate the story. It may take you some time, but charts can always be re-used.

- You can often use a story at the beginning of a lesson. Later ask questions about story followed by children's activities.

At the end of lesson: Re-tell story.

Ask questions on it again.

Relate story to children's activities.

Thus, the story can be told twice: at the introduction to a lesson, and at the end. It helps to emphasise ideas in the children's minds. However, it is not always necessary to tell a story twice. You, as the teacher, must learn to judge this for yourself. You may only have to remind the children of the main points in the story.

Science games

A game often, but not always, introduces competition. There are advantages and disadvantages in this. But, mostly, children enjoy games. A game adds to the interest of a lesson. Games usually have rules and as children grow up, they like to learn these rules and keep them.

You can often teach a game in your science lesson. The children can then play the game in their activities lesson or break periods. Remember the following points about games:

- They should be simple to play.
- They should be enjoyable for the children.
- They should have simple rules.
- Think about the scientific processes in the games.

Here are some examples:

Sounds around

The children sit very quietly for two minutes, and listen carefully to all the sounds they can hear. Then they write down a list. The child with the longest list is the winner.

Classification games

Leaf matching

Collect a number of leaves from different trees around the school. Give a leaf to each child in the class. The one who comes back first with a matching leaf is the winner.

Property matching

Using the property shapes described, give a shape to each child. Keep one shape for yourself. Don't let the children see your shape. Then say to the children:

'My shape is blue. All children with blue shapes, hold theirs up'.

Then say:

'My shape is round and blue. Any one who does not have a round blue shape should put his hand down'.

'My shape is large and round and blue'.

Any one left is the winner. His shape should be just like yours. (To play this game, you need at least two sets of the property pieces.)

Counting games

There are so many counting games to play that it is difficult to select any particular ones. Here are some examples:

Pick-a-match

Dye used matchsticks like this:

One blue match (= 10 points)

Five red matches (= 5 points each)

Ten green matches (= 2 points each)

All other matches (= 1 point each)

One player holds the matches in a bundle and then lets them fall so that they scatter into a pile. The other children then use another match to take away a match from the pile. If any other matches move when they do this, they lose their turn. The children then count up the points for their matches at the end of the game. The one with the most points is the winner.

Inference games

An inference game is already suggested in the previous section. But there are many others. Here are two examples.

Problem bags, boxes and tins

It is very important that we should try to develop the sense of touch in children. Observation is involved here. But the children can learn to make inferences from these observations. Put a number of different objects into a bag. Let children feel in the bag without looking, and guess what the object is. You could make this into a group game in the following way:

Give each group a bag of objects. One child feels in the bag, and describes the 'feel' of an object. The other children try to guess what it is. The person who guesses right then feels in the bag.

Sink and float games

A bottle top can be made to float if it is placed gently on to the surface of water. Children can then put buttons onto the bottle top until it sinks. 'Who can put on the largest number of buttons before it sinks ?'

Using the children's interest

In many ways, science is an easy subject to teach. Children are naturally interest in it. There are several ways in which you can use their interest to teach in a stimulating and exciting way. Telling children 'facts' is not a very stimulating way. Of course, there are times when you have to do this. But science is only really worth teaching if it causes children to think. This makes the teacher's job much more difficult. Here are some suggestions for using children's interest.

Problems

Problems create interest. By hiding objects, as suggested above, problem situations arise.

- A problem catches children's attention. It is a good way to begin a lesson.
- Problem solving can easily be related to the real world. Everybody has to face problems.
- A problem solving approach stresses processes (or skills) rather than facts.

'How do seeds get away from this plant ?' is a problem question. This may lead us to an experiment to find the answer. We, as teachers, may know the answer. But the answer may not be obvious to children.

Whenever you start a new series of science lessons, try to begin with a problem. This will arouse children's interest, and it will lead into a new line of questions.

Dramatic experiments

These are often a good way to begin a lesson. They catch the children's attention and throw up many points for discussion. Here are some examples.

1. Siphoning from one container to another. When container A is above container B, liquid flows from A to B. What happens when B is above A ?
2. A balloon on a bottle in hot water. What happens ?
3. A bucket of water is placed on a piece of cardboard. A tube is tied into a plastic bag. The plastic bag is now placed under the cardboard. Blow into the tube. What happens ?
4. A magnet inside a box. What happens if pins or metal paperclips are now held near the box ?
5. Heat a little water in a tin with a fairly tight-fitting lid. What happens ? Care is needed with this experiment.

How would you develop lessons from these demonstrations ? Remember that the experiment by itself is not particularly important - except to attract interest. You then have to use the demonstration to encourage children to think.

When we pose a problem, we can ask children for a hypothesis. The hypothesis may lead to an experiment.

Try to create problem situations in your classroom. Sometimes, you can use a problem in your science lesson. Sometimes, you can pose a problem on the discovery table. You can often begin a lesson with a problem but that is not the only place for them. For example, you may be able to turn a child's question into a problem which he can try to solve for himself. This is much better than to tell him the 'answer' by yourself.

The candle, jar and tin problem

A candle which is burnt in a closed space goes out. So, if you place a jar over a candle, after a time, the candle goes out. If you repeat this experiment several times, you will find that the time taken varies slightly. You can create a problem situation by placing a tin over the jar. Now the question is: is the candle out ? If you do this as a demonstration for the children, you can ask them to guess when it is out.

You can make the problem more difficult by placing a tin only over the candle. If the tin is taken off the candle, more air gets into the tin. So the candle continues to burn for longer. Can you think of a way of solving this problem ? Try it for yourself. Can you think of any indirect ways of telling if the candle is out ?

Problem with seeds

Germinating seeds are a favourite subject in primary science. With them, you can create some excellent problem situations. Children should have some experience with germinating seeds before you try the problems suggested here. Encourage children to think of problems for themselves. Here are some ideas:

- If we cook a seed, will it still germinate ?
- Will an orange seed germinate ?
- Which germinates quicker: a maize seed or a bean seed ?
- What happens if we turn a seed upside down after it has started to grow ?
- How long does a root grow in one day ?
- If we cut a bit off a seed, does it still grow ? Does it matter which bit we cut off ?
- If we plant a maize seed fresh from the corn, does it still germinate ?

You and your children be able to think of other problems to try to solve. If you do not know the 'answers' to the above questions, do not worry. The important thing is to do an experiment to find out what happens. Help children to think of suitable experiments.

Try to make all your lessons problem oriented. You will be surprised how interested children are when they are faced with a puzzle. Try to make them think for themselves.

Resources Around Us

Children are interested in themselves and their bodies. There are many things which they can learn about themselves. Counting, measuring, classifying, experimenting and inferring are some of the processes which can be developed. Communicating (especially recording) will be a part of all the activities described as follows.

Counting

a. Teeth

These can easily be counted. Children can:

- count the number of teeth in each other's mouths
- count how many different kinds of teeth they have
- count the number of teeth of their parents, and any younger brothers or sisters. Do children have as many teeth as adults ?
- look at the teeth of other animals eg. dogs, cats or cows

Make children record some of this information. Let children bite into a piece of fruit, a yam or a potato. What do the marks tell them about the functions of our different teeth ? Which teeth are used for cutting food ? Which teeth are used for crunching or grinding food ? Tell them about the types of teeth and their functions.

b. Breathing and pulse rates

Children can count the number of breaths which they take in 15 seconds. They can do this by watching the chest or placing a hand on it. Now let them run around the school compound once, and again count the number of breaths in 15 seconds. What happens ? Let them repeat the experiment running around the compound 2, 3, 4, 5 times. How does this affect their breathing rates ? How would you suggest that they record their results ?

They can do a similar series of experiments with their pulse rates. Show the children where to find their pulse on their wrists. (Remember that sometimes it is difficult to find the pulse on a child. Practice is needed.) Let them count their

pulse rates at rest and after running around the school compound 1, 2, 3, 4, 5 times.

Measuring

a. Height

Children can measure their heights. Remember that they should record their heights in the following way:

Between 110 cm and 111 cm

or About 110 cm.

Let all the children in the class measure and record their heights.

b. Around the body

Children can measure around their bodies. They can use string to measure around wrists, heads, waists. Results can be recorded either in cms or inches. These activities are valuable as a follow-up to other lessons about perimeter and so on.

c. Our feet

Let children draw around their feet on a flat piece of old newspaper. Now let them cut out these footprints. They could be stuck to a large piece of paper in order from the shortest to the longest.

Let children measure the length of their feet with a ruler. They could put a ruler on the floor against a wall, and then upto their foot on top.

Are a person's right foot and left foot always the same length ? Let children record the lengths of each other's feet.

Should there be a separate chart for boys and girls ?

How quickly can you do a puzzle ?

On a piece of card board draw the diagram of Human system (parts of the ear or eyes or respiratory or digestive system). Cut them into equal blocks. Ask children to fuse them by identifying the parts.

Similarly a cross board puzzle can be played. Examples: Nutrition, vitamins, deficiency diseases and so on.

Snake and Ladder Game

Prepare a snake and ladder game on topics like food and nutrition, deficiency diseases, communicable and non- communicable diseases. The main purpose here is, children will be able to see the cause and effect relationships, learn the terminologies used in an interesting manner. Make them aware of the rules of the game, to toss the dice, and how to move the coin according to the number on the dice played on the snake-ladder card board.

How much can you hold in a handful ?

One way to find out is to pick up a number of seeds and count them. Can you pick up as many seeds with your right hand as with your left hand ?

Try this experiment with a class of children. Make children record the results.

Another way to measure the volume of your fist is to put it into a large tin of water. Mark the level of water before and after. Measure the distance in which the water rises.

Try this with children. Are their left hands as big as their right hands ? Does the water rise further when the hand is flat or when it is a fist ? Who has the biggest hand in the class ? Let them find out.

Classification activities

a. Face shapes

Children can look closely at each other's faces. Ask them to make a list of the ways in which faces differ.

Ask them to draw full face and profile views of their friends.

Can they classify the faces of their friends ? Are they:

* round * oval * square * oblong * heart-shaped ?

b. Classifying by taste

Can children identify foods when blindfolded ? Obtain some of the local foods of your area and let children try this. Can they classify tastes into sweet, sour, salty and bitter ? Find out

Squeeze a lime or lemon. Collect the juice. Add water, but make sure that the solution tastes strong. Pour half into another container, B. Add water to B. Continue this process until you have a range of about eight solutions of lime juice. Each will be more dilute than the previous one. Now ask children to put the solutions in order ... by sight ... and by taste. How easily do they do this ? Do they find it more difficult to put them in order by taste when they are blindfolded ? Find out.

c. Classifying by smell

Collect several old tins. (Condensed milk tins would be suitable.) Make sure they are clean. Collect a number of substances with a strong smell. They could be liquids or solids. Put each substance into one of the tins. Cover it with a piece of old mosquito net. Can the children recognise the substance from its smell ? Some substances you might try to include are:

* tea * coffee * onions * paraffin * peppers * chopped grass * soap * soap flakes * fish * sour milk * a substance which does not smell eg. sugar or salt.

d. Classifying by feel

Let children blindfold one member of a group. They then give to the child a number of objects which he has to feel. The other children could write down his comments:

- What texture, size, weight are the objects ?
- Do they feel warm or cold ?
- Are they in more than one piece ?
- Can the blindfolded child name the objects ?

Find substances whose surfaces feel different. For example:

* paper * cardboard * polythene * wood * cotton * wool * sandpaper * silver paper * metal (tins) * glass (bottles) * plastic * skin

Resources around the school

The sky above

There are many resources around us. For example we can encourage children to lie down outside and look up in the sky. What can they see in the sky ?

- Can they see clouds ? What shape are they ? Are they moving ? Can they see different kinds of clouds ?
- Can they see birds ? Are the birds low or high ? Are they big or small ? How can they tell ?
- Can they see insects ? What kinds of insects ?
- Can they see aeroplanes ? Can they hear the aeroplanes ?
- Can they see the tops of trees ? Are they moving ?
- What colour is the sky ? Is the sky always the same colour ? Is the sky the same colour in one place as it is in another ?
- Can they see the moon ? What shape is it ? Can they describe its position in the sky ?
- What happens if the children change their position ? Does anything in the sky change its position ?

Let children make drawings of what they have seen in the sky.

The moon cycle

Because children are not at school during the night, it is difficult to use the moon cycle in science lessons. However, you can encourage them to observe

the moon when they are at home. Discuss it with them the next day in school. Ask them to find out.

- where the moon rises
- where it sets
- how its shape changes each night
- how long is its cycle ?

Shadows and shadow games

Shadows are a useful (and plentiful !) resource for teaching science to young children. They can help to develop children's ideas of space and time. Here are some suggest- ions for children in lower primary classes:

a. What is your shadow like ?

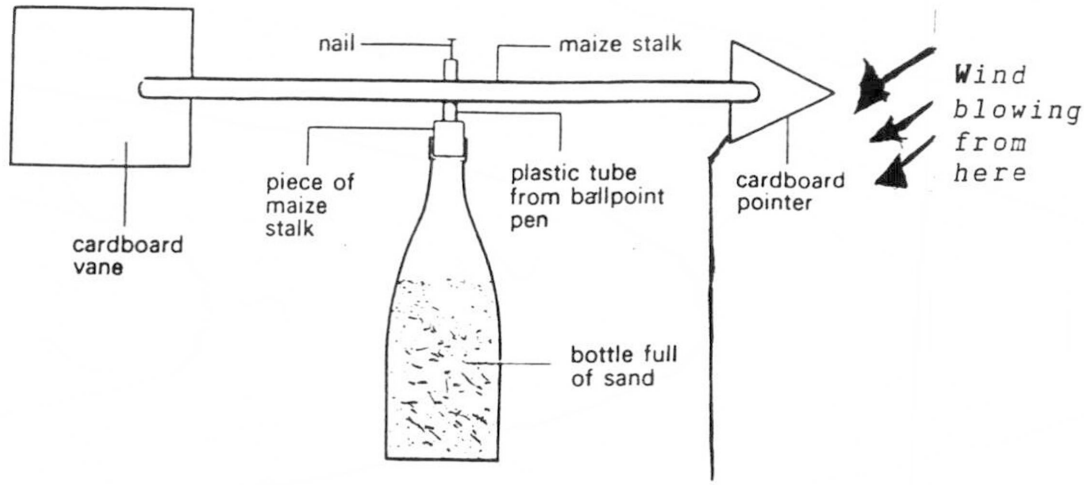
- Make the biggest shadow you can with your body.
- Make the smallest shadow.
- Make the longest shadow.
- Make the shortest shadow.
- Stand so that your shadow is behind you.
- Stand so that your shadow is in front of you.
- Touch your shadow.
- Escape from your shadow.
- Shake hands with your shadow.
- Can you move without your shadow moving ?
- Can you hide your shadow ?

- Can you jump on your shadow ?
- Can you 'catch' shadows on your body or on your hand or on a sheet of paper ?
- Work in small groups to make a shadow with four arms, four legs, six arms, six legs.

Younger children could play a game of 'blow football'. They could make a ball from waste paper and blow tubes from hollow stalks or rolled-up paper (Fig.). They could mark out a 'football pitch' on a table and make 'goal posts' from dried grass. The two players have to try to blow the ball through each other's goalposts. They are not allowed to touch the ball with their tubes. The children can make up their own rules for the game. Encourage them to think about the scientific aspects of the game.

- Why is a narrow tube better than a wider one ?
- What causes the ball to move ?
- Why does paper make a good ball ?
- Could other materials be used ?
- What happens if the two players blow at the ball from opposite directions ?

Older children could learn to use a wind direction indicator. Ask children to make one mind indicator by using locally available materials.



1. Cut a piece off an old plastic ball-point pen, about 5 cm long.
2. Find a straight, dry maize stalk about 1 metre long. Cut a small vane and an arrowhead out of thin cardboard. Push these into slits at each end of the maize stalk as shown.
3. Find the point of balance of the maize stalk. Make a hole in it with a pair of scissors. Push the plastic tube through this hole.
4. Fill a large bottle with sand, so that it is heavy. Cut off a piece of maize stalk and push it into the bottle like a cork (as shown).

5. Now push a large nail through the plastic tube. It must not be tight. Push the end of the nail into the maize stalk in the bottle. The indicator should swing round easily.

You could fix the indicator to a pole in the school compound so that it is high up. Let children keep records of wind direction each day:

- in the morning
- at midday
- in the evening

A cloud is a collection of thousands of droplets of water. Sometimes the drops come together to form rain. You can demonstrate this principle to children like this:

Heat a small quantity of water in a tin by means of candles and the candle heater.

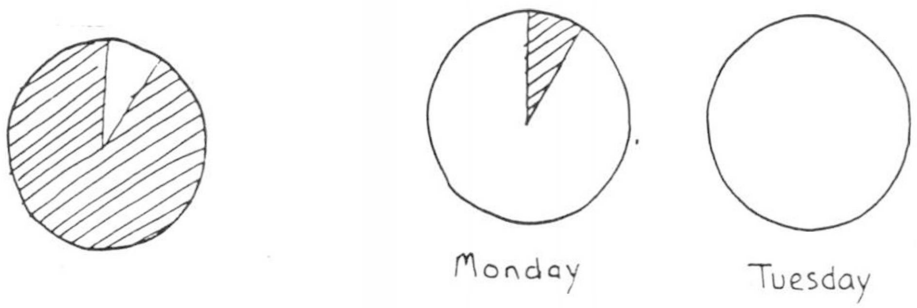
When the water is hot, the children will see steam rising from it. If you hold a cold tin above the steam as shown, the steam condenses back to water.

Let children observe clouds on a suitable day. Can they describe their properties ? Their size, shape and colour ? They could record these properties by making a drawing of a particular cloud. Does its shape change ? Is the cloud moving ? In which direction is it moving ? Is it moving in the same direction as the wind ? (Students can use your wind direction indicator here).

Can children estimate how much of the sky is covered by clouds ? This is not too easy. You could help them to make reasonable estimates in the following way:

Draw a big circle with chalk on the floor (about 50 cm in diameter). Tear up paper to make small irregular pieces. Put them in the circle. The children will see that not all the area inside the circle is covered with paper. If they move the pieces together, they will see that about half the area is covered. Take some pieces out of the circle and let the children repeat the activity. Now perhaps the area is only one-tenth covered. Repeat the activity again for, say, three-quarters of the area covered.

Now take the children outside and let them make reasonable estimates of the cloud cover. They could record their estimates back in the classroom. For example, they could draw a circle in their science notebooks, and shade it in with a crayon. They could estimate the cloud cover each day for a week. They should do this at the same time each day.



Children can also play a game on Rain. Here is an example.

RAIN

Purpose

The children find this lesson both interesting and thought provoking. They like it because it is a game, and it is easy. It helps show children what games are like, how to use the environment around them, and how to "think on their feet" and relate to others. They learn co-operation, which is very much the "Indian Way".

Objectives

The children should know where the game comes from, and why it is important. They should be able to remember all the steps and be able to play the game by themselves. It would be really good if the students could add variations, such as a lull in the storm, or more than one storm, but having the students get through the game on their own is a reasonable outcome to expect.

Resources/Materials

All that is needed is a space with a hard floor (wood is best), or heavy tables. The student need to be able to get down on their knees or sit on the floor. Patient neighbours are also needed, as children can really "get into" the game and may get noisy in their enthusiasm.

Activities and Procedures

A class of 20-25 is a good size. The students sit in a circle if possible. The teacher leads to discussion on Indian games. Games, in the old days, often helped sharpen skills needed in adult life. Games are also just for fun.

Games would reflect the environment the children lived in, as well as their culture.

The teacher explains the game "Rain". It is a game played long ago on the north west coast. It rained a lot there, and one can imagine the children having to stay indoors and responding to nature outside. They made up a game, creating the sound of a rain storm using the wood floor.

The teacher asks what often comes before rain. Wind often picks up, and that is the answer sought. The students make circular motions on the floor, and it sound like wind. (If the floor doesn't have a good sound, heavy table will do.)

The next part is small drops of a rain shower. The sound is made with the fingertips striking the floor softly, then a little harder. A leader shows the students how long to have the wind build up, and when to start the raindrops. The sounds should overlap.

The next sound is rain. This is made with all the fingers on each hand hitting quickly together. The last new sound is a hard rain, made with the palm of each hand pounding very quickly.

The rest of the game is played in reverse order, as the storm passes. Variations can be added, such as shower or two with wind in between before the heavy rain hits.

Once students have mastered the basic steps they should close their eyes and listen to how real it sounds. The whole game may then be played in a dim or dark room.

Trying it all together

A follow-up discussion on Indian games should prove fruitful. Students may also want to learn other games from other tribes in different parts of the country. The kinds of games and materials used can be contrasted and compared to the climate and resources of different tribes.

The children have also found out that they don't need "things" to have fun. They love to bring in an outsider and have them guess what the sounds are.

Interesting places

There may be many interesting places around your school which you can visit during your science lessons. Sometimes, you may take the children to these places in your social studies or geography lesson. But remember that you can always teach some science on these visits as well.

Many people in your community may be interested to show children their work. The carpenter, the mechanic, the cobbler, the blacksmith, the farmer, the dispensary attendant, the potter ... these are some of the people whom you can visit. Interesting places might include the market, a hillside, a pond, a stream, a forestry plantation, a dairy, a sugar estate, houses being built, zoo, bird sanctuary, poultry and so on.

Planning the visit

Why ? A visit will only be useful if you plan it carefully. What is the purpose of the visit ? What do you want the children to learn ? You must be clear about your objectives. (For example, a listening walk, a feeling walk, an I-spy walk would have different objectives).

When ? Decide when you want to make the visit. Check that the time suits the headmaster and other teachers. If you are visiting people, make sure that the time suits them

How ? Always do the visit yourself first. Note any interesting things which you will point out to the children. You could record them in a notebook so that you don't forget them. Walk the route which you will take with the children. Are there any roads to cross ?

Discuss the visit with them. Make sure that they understand why they are going and what they will be looking for. Teach them how to keep together on the visit. Teach them to listen when you want to point something out to them. You may find it helpful to divide the class into groups, each with a leader. Different groups might investigate different things on the visit. The more time you spend on planning the visit with the children, the more they will learn.

The visit

Encourage children to observe carefully and to ask questions during the visit. If they find interesting objects let them bring them back for the discovery table.

After the visit

Let the children talk about what they saw and heard.

Let them make drawings or paintings or collages.

Let them write about their experiences.

Can they estimate how far they walked ?

Sometimes, their records may be individual ones, sometimes there may be group records. Discuss any objects which have been brought back to the classroom. Leave them on the table (but for no longer than a week !).

The school compound

Small animals, plants and soil can be found in most school compounds. They are all useful in teaching science.

Where to find them

Look around your school to discover the best places to find small animals. Flowering shrubs, bushes and hedges are good places for flying insects. Insects, snails, beetles and millipedes hide under big stones, logs and leaf litter. Ponds and puddles are good places for mosquito larvae, beetles, tadpoles and dragon-fly larvae. In the classroom, dark corners may hide flies, spiders, and mosquitoes. You will also need plenty of containers in which to keep the animals. Tins, bottles, boxes, matchboxes, jars and cigarette boxes are all useful as temporary containers.

SECTION 5

LESSON 1

DOMESTIC ANIMALS AND WILD ANIMALS

Competencies

1. **identifies different types of animals**
2. **differentiates between the domestic and the wild animals**

Activity 1

Teacher can take the students outside the classroom and ask them to list out the different animals that they see around. **Teacher may ask the following questions after the field visit.**

Questions

How many different kinds of animals do you see ?

What are the similarities amongst these animals ?

In what ways do a cow, dog, monkey and goat look similar and in what ways do they look different from each other ?

What are the common features that you find among insects ?

Through discussion the teacher helps the pupils to generalise that:

(a) Most four footed animals like the cat, dog, monkey, squirrel have hair on their bodies. Their bodies can be divided into head, neck, torso and limbs.

(b) Most birds have feathers on their bodies, two wings and two legs.

(c) Insects have six legs, and fragile paper-like wings.

Activity 2

Teachers can show/display charts showing different kinds of animals and ask the children to identify and classify them into the following groups and the way they move:

Animals with six legs
Animals with four legs
Animals with two legs
Animals with many legs
Animals with no legs
Animals that run
Animals that crawl
Animals that fly
Animals that swim
Animals that eat flesh
Animals that eat plants

Activity 3

The teacher may take the students for a field trip to zoo (if zoo is located nearby) and ask them to list out the animals seen in the zoo.

Activity 4

The teacher may ask the students to collect pictures of wild animals and ask them to stick it in the chart/album.

The activities 4 and 5 from teachers hand book may be followed in continuation of this activity.

Activity 5

Provide a list or pictures of wild and pet animals together and ask students to identify the pet animals and wild animals. Divide the class into two groups (one for pet animals, and another for wild animals). Ask the groups to provide the reasons for calling them as pet or wild animals.

Competency 3: recognises the uses of different animals.

Activity 6

Divide the class into three groups. Give the groups the following activities. Instruct them to observe their environment and perform the given activity.

Group 1: Listing the names of animals that carry the load (specify the load).

Group 2: Listing the names of animals that give us milk and the names of milk products that are made from the milk, and animals from which we get eggs and meat.

Group 3: Listing the names of animals that give us wool, silk, fur and leather.

Group 4: Listing the names of animals which are useful in other ways.

Activity 7

In order to make students know the uses of different animals, wrap ups may be designed as follows, and given to the students to match the animals with their uses. The names should be on the left hand side of the wrap and the uses on the right hand side.

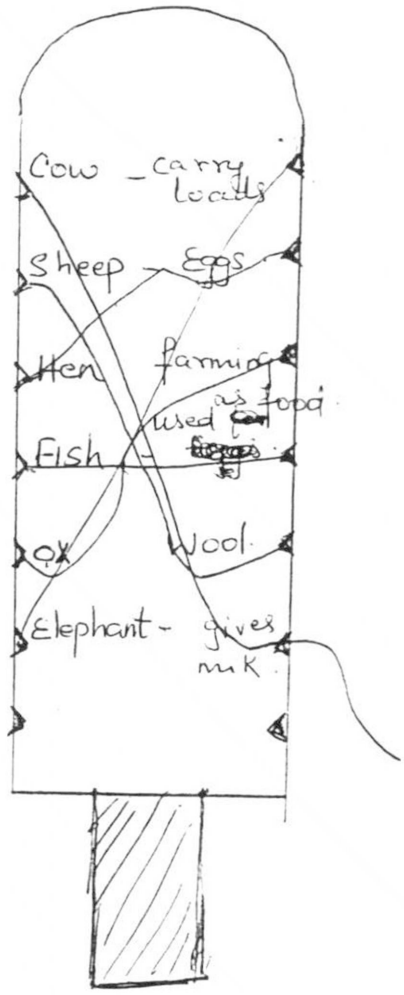
How you can design a wrap up ?

Wrap ups provide extra practice for simple drill activities. They can be made using various size pieces of poster board. This is an excellent way to use scraps. One can match the question with the answer. Self-checking can be provided on the back. Wrap ups are designed for one student at a time.

To make a wrap up, take a piece of poster board or heavy tag board.

1. Cut a piece of poster board about 3 inches by 8 inches, you should be able to hold the poster board comfortably in your hand.

2. Write or glue questions down the left-hand side and answers down the right-hand side of the poster board.
3. Cut notches next to each question and answer.
4. Punch a hole at the top of the card and attach a long piece of string.
5. Starting on the left side, wrap the string from the first question around the front of the card to the correct answer on the right-hand side.
6. Move the string around the back of the card until you reach the second question. Repeat.
7. Keep the wrapping until all questions are answered.
8. With a pencil, lightly sketch in the answer lines on the back of the poster board.
9. Test the card again.
10. Darken the answer lines by using a ruler and a marker.
11. Title the front of the card.
12. Include a simple set of directions and an arrow so students will know where to start. You may want to mark the first answer on the front of the card to get students moving the string in the right direction.
13. Remove the string and cover it with a lamination film or clear contact paper.
14. Punch through the hole to remove the lamination film and cut the film through the notches.
15. Tie yarn or string onto the card.
16. These cards can be stored in a labelled file folder for easy recovery.



Competency 4: understands the need for conservation of animals and the ways of taking care of animals.

Make the group to discuss among themselves and provide the details in the following column.

Activity 8

Sl.No.	Pet animals	Food that is given	Their homes	Health care

Competency 5: understands the methods of reproduction in animals.

- Living things reproduce their own kind.
- Some animals reproduce their own kind through eggs laid externally.
- Some animals pass through a cycle of change from egg to adult.
- Some animals give birth to young ones.

Activity 9

Begin the class by asking the students for examples of animals that lay eggs. Call their attention to the fact that a chicken hatches from a hard-shelled egg and that the young chicken is like the parent chicken. Ask them to site more examples where the young ones resemble their parent.

Make students to generalise from their own examples and arrive at the concept that "living things reproduce their own kind".

Activity 10

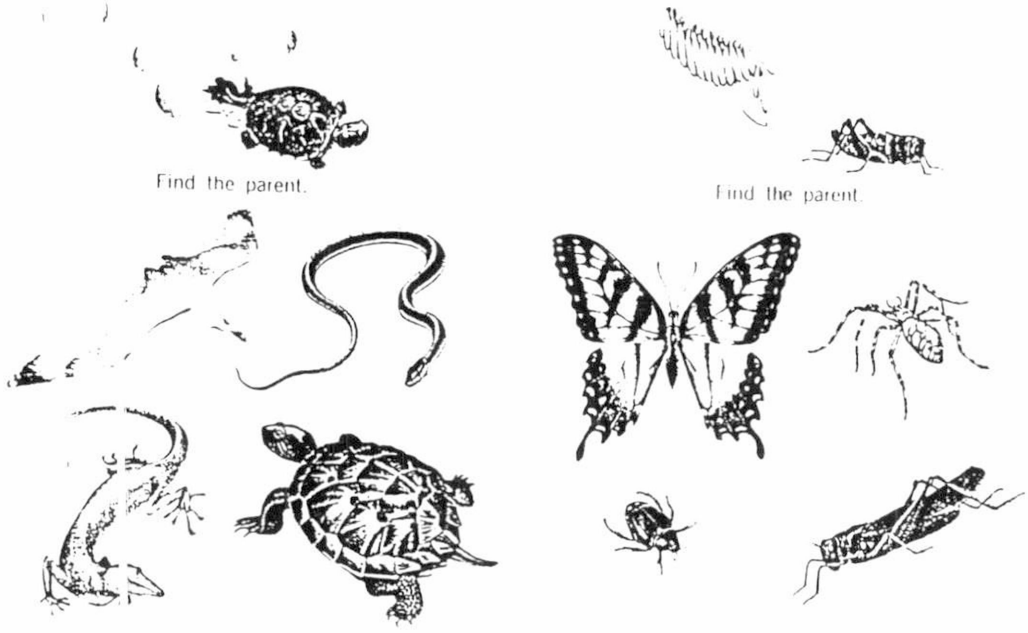
Describe the life cycle of butterfly/silk moth/frog using diagrams or models or specimens collected at different stages of life cycle.

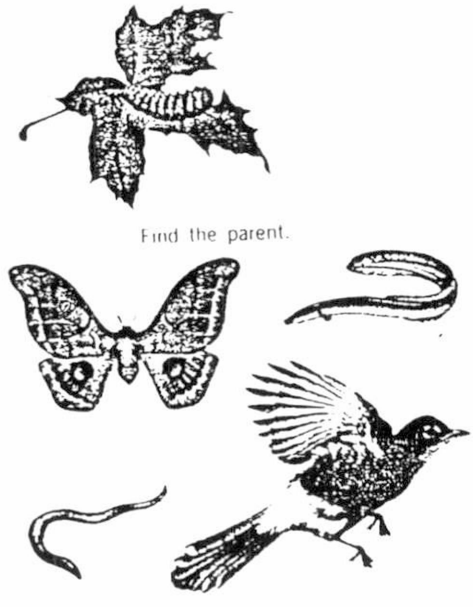
Activity 11

"**Find the parent" titled snake and ladder game**.

Plan a snake and a ladder game having the pictures of animals passing through the stages of life cycle, of reproduction (egg to adult) and some animals giving birth to young ones. Demonstrate to students as to how to

play the game by using the dice and identify the parent of the young ones, or you can prepa e flash card of animals and their young ones and ask students to identify as sho vn in the figure.





If children keep insects like moths and butterflies in the classroom they may be able to observe its life cycle.

Activity 12

Assign the following activity to a group of students with the instructions as provided here.

You may find sometimes eggs of the butterfly or a moth laid on the backside of the leaf of certain plants. Collect such leaves and put it in a glass bottle or a container, with a gap or a hole for breathing and keep it in the corner of the classroom. (Instruct the whole class to observe the container, draw and record as follows).

When the butterfly or moth appears from the coccon stage, ask students to let the butterfly out of the bottle.

Stages	How it appears (with figures)	Number of days taken to change from one form to another
Egg		When collected (date)
Larva		Egg → Larva
Cocoon		Larva → Cocoon
Butterfly		Cocoon → Butterfly

Activity 13

Ask students to collect frog spawn (frog's eggs) from ponds, rivers, or streams at certain times of the year and provide suitable conditions. Ask them to observe the changes that take place (from egg to tad pole, tad-pole to fish like, fish-like to young frog) and record their observations with figures if possible.

LESSON 2

SIMPLE MACHINE

Competency : knows certain simple machines and their uses in daily life.

Besides the activities provided in the teachers' handbook, certain supplementary activities and problem centred activities suggested here may be used in the classroom.

Activity 1

Teacher can use the items given in the operation blackboard kits to illustrate the working functions of lever, pulley, inclined plane and spring balance.

Activity 2

Teacher can ask the students to list out the common simple machines which they use, and which they see around them (both home/school) and fill up in the following table.

Sl.No.	Name of the simple machine	Use

Activity 3 (problem-solving)

Present the following problem to the whole class. Allow them to generate as many hypothetical solutions as possible, and arrive at a correct solution after stimulating discussion among themselves.

Problem

In the backyard where Raman lives, huge boulders landed a few months ago. After a heavy rainfall, one day Raman noticed a hundred rupees note under a boulder that probably weighed over 300 Pounds. Raman found it impossible to lift the rock. Pose the problem as follows.

*** How can he lift the rock to get the hundred rupees note ?**

Allow the students to generate possible hypothetical solutions, design some simple experiments to test the hypothesis, and arrive at the solution that the lever is the most effective tool to use in moving the rock.

Activity 4

The following anecdote may be provided to the students followed by a question.

"Geetha's mother, needed a very heavy comfortable chair to be moved from bedroom to the hall. She could only lift a corner of the chair and it was too heavy for Geetha and her mother to move. No other help was found around.

*** Problem**: How can they move the chair from bed room to the hall ?

Allow the students to formulate possible hypotheses. The expected hypotheses could be:

1. A rope could be tied around the chair and the chair pulled into the hall.

2. A crowbar could be applied to the chair to push it a little bit each time the crowbar was applied.
3. A small rug or plastic could be placed under the chair, and the chair could be slipped into the hall.

After a stimulating discussion regarding which of the above would work, the children may be allowed to move a heavy object from one place to another by choosing the above hypotheses. Since the first and second hypotheses may fail to move the object, the third, hypothesis may be tried out with a simple experiment as follows.

A box containing several heavy books may be used instead of a heavy chair. A large piece of plastic and a small bathroom rug may also be used. When the box could be moved using this technique, you may ask students

*** Why did the plastic and rug make it easier to move the heavy box with books ?**

The students may observe and tell that a smoother surface was required. Discuss with students to establish that reducing friction increases the efficiency of work. Because a certain amount of friction is always present when any machine is working. It is useful to develop this concept along with the understanding of how simple machines operate.

Activity 5

The students may be provided with a spring balance, objects to be lifted such as books, and wooden boards to be used inclined planes. Ask them to

compare the weight of different objects lifted with the force required to move each object on an inclined plane and fill in the following column.

Sl.No.	Object	Weight of the object on an inclined plane	Weight of the object without an inclined plane

Extended Activity (Field Trip)

Field trips to the farm, the garage, the hardware store, the kitchen, toy shops, and building construction sites will reveal various types of simple and complex machines. Have a follow up activity after the field trip by asking following questions and holding a discussion with the students.

1. Which of the machines are really helpful ?
2. Do some of them pollute the environment ?
3. Can anything be done to minimise such pollution ?
4. How do machines give us power ?
5. Can we do away without the help of simple machines ?

These questions can provide stimulating activity in discussions and further observations and field investigations.

LESSON 3

PLANT LIFE

Competencies:

1. Identifies the parts of a plant.
2. Sees relationship between the parts of a plant and their functions.

Parts of a plant

Activity 1: Visit to the garden (observation)

Ask pupils to observe the number of plants and trees in the garden. Ask them to identify the plants and write their names in their scrap note book.

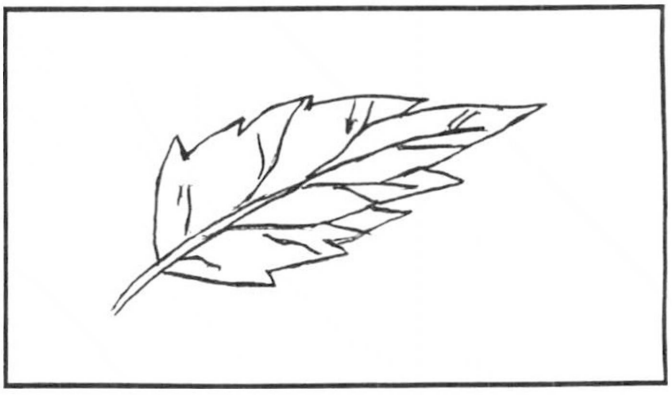
Ask them to take a leaf from each type of plant, and paste it in their plant album with the name and the following details.

Example:

Date of collection:

Place where collected:

Name of the plant:



Tell the names of the plants that they could not identify.

Discussion (ask the following questions)

1. How many plants did you find in the garden ?
2. Did they look similar ?

3. In what ways were they found similar ? and in what ways were they found different.

Activity 3

Distribute a plant each to the students. Ask them to identify the parts of the plant and discuss and share in their groups.

Activity 4

Divide the class into groups and give each group three different plants. Ask them to examine the plant structures. Help them to arrive at a generalisation.

"Plants have leaves, stem, roots, and sometimes flowers".

Root and its functions

1. Roots fix the plant firmly in the soil.
2. Roots absorb water and mineral salts from the soil.
3. Some roots store food.

Activity 5

Take a potted plant to the class. Ask one or two students to come forward and pull the plant from the soil. When he fails to do so or pulls it with great difficulty, ask the following questions to the class.

1. Why was it difficult to pull the plant from the soil ?
2. Which part of the plant is below the soil ?
3. Ask the pupils to examine the roots carefully and explain how the roots firmly fix the plant in the soil.

Activity 6

Ask the students to pull up the weeds in the school garden and in the nearby surroundings, and to observe the roots and the clinging soil.

Activity 7

- What happens to the plant when wind blows ? (ask students to observe and come to the class, and help them to draw a conclusion that plants are fixed firmly in the soil by roots.

Activity 8

*** What would happen if roots are removed from the plant ?**

Ask each group to do two sets of experiments as follows.

1. Two beakers filled with water.
2. In one there is a balsam plant with root, and in another there is a plant without root.

Ask the students to observe the changes in the plants A & B and record the observations. Make the groups to interact among themselves by asking questions to each based on the above two experiments and infer the results. For example,

Group A: How do you say that water is rising in the plant ? Can you give any proof ?

Group B: The water level was marked in the glass container before putting the plant.

Group A: What happened to the balsam plant that was kept in the coloured solution ?

Group B: The water is seen rising through the plant.

Activity 9 (Teacher can instruct the students to do the following activity to show how roots are useful)

1. Obtain a petunia and remove all the roots, obtain some soil and fill the bottom half of plastic bag. Place the plant with the stem down, on top of the soil. Observe the plant when you let it go as above.

* How do you think roots might have helped this plant ?

(get students to respond to this question.)

2. Turn the stem right side up and push it to a depth of almost 2 inches into the soil. Water the plant daily. Allow it to set for 4 or 5 days. Ask the following question.

* What do you think will happen to the plant ? (let students hypothesise).

3. After 4 to 5 days, record what happens.

* How do you think roots might have helped the plant ? (let students reason out.)

Activity 10

Ask pupils to place carrot in water coloured with ink. After letting the jar stand in the sun for several hours, ask pupils to cut the carrot lengthwise and also crosswise near the top. Ask them to notice the coloured lines that indicate the circulation of the coloured fluid in the carrot.

Stem and its functions

- Stem conducts water to different parts of the body.
- Stem bears branches, leaves, flowers, and fruits on its body.

"Why are stems important to plants ?"

Ask the above question to the students and collect their different responses. To confirm the right answer, conduct the following activity.

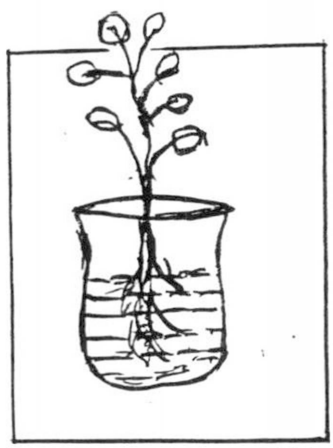
Activity 11

Ask students to obtain different types of stems. In what ways they are different ? Ask them to observe the differences.

Ask the question "How to you think water and minerals get from the roots to the leaves and flowers ?"

Ask students to break open the stems, and feel the water content inside of the stem. And ask "Why do you think stems contain water ?" Let students infer that the water is conducted to the other parts of the plant body such as branches, flowers and fruits.

Ask students to repeat the Activity 8 (experiment with balsam plant) to show that the stem conducts water.



Activity 12

Ask students to bring the vegetables like radish carrot, and state that some roots also store food. Ask students to identify similar storage roots in their environment which are edible and non-edible and find out their names.

Activity 13

Similarly show some underground stems like potato, ginger and sugarcane and explain that some stems also store food. Ask students to identify some underground stems and find out their names (instruct the students as how to identify a modified root and a modified stem).

Activity 14

Ask students to observe the stems of every plant in the school garden, or in the environment and identify the other function such as stem bears branches; leaves, flowers and fruits.

Leaf and its functions

To make the students understand the functions of a leaf, the activities provided in the teachers hand book (Activity 4) may be referred. In addition the following activities may be carried out.

Why are leaves important ?

Pose the following question to the students "What do you think would happen to a plant if you removed all the leaves from it ?" To confirm the right response, ask them to carry out the following activity.

Instructions to students

Label the pots 1, 2 and 3. Put all the pots in a sunny place. Do not water pot 1. Let the soil dry out. Put just enough water in pot 2 to keep the soil damp, but not muddy. Keep pot 3 filled with water. Put just enough water to cover the soil and reach the top of the pot.

Which plants will grow best ? In a week or less you will be able to find out.

Ask students to record their observations every day. Ask the following question and have a discussion.

Why did the plant in pot 2 grew well, whereas the plants in pots 1 and 3, did not grow ?

Plants need soil to grow

Activity 20: (Group 1)

Soak some seeds in water overnight. Plant some on a wet sponge and others in good soil. Keep in the sunlight and water daily. Compare your results with the other group.

Activity 21: (Group 2)

Plant some seeds in sand and others in garden soil. Keep in the sunlight and give each the same amount of water at intervals. Compare your results with the other group.

Do on your own: (Teacher may give the following as an additional activity).

Dig up a small weed or green plant and wash off the roots. Put the plant into a glass of water and study the root system. Observe and draw in your note book.

Plants need sunlight

Activity 22

Instructions to students

Bring any 4 well grown potted plants which had water as well as sunshine throughout. Move any 2 of the plants into the dark place. Be sure that all 4 plants get plenty of water. Everything should be the same, except that two of the plants are not to get any sunlight.

Find out: Will this make a difference ?

> Which plant will grow better, those in the sunlight or those in the dark ? (ask pupils to observe periodically)

After a week, the plant kept in the dark will look pale and weak. Some of the leaves will be found fallen. The plants in the sunlight will appear still strong and green.

Discuss

Why do two of the plants now look different from the other two ? What has made the difference ?

Suppose, we move back the plants which are weak into the sunlight, would they become green and strong ? What would make the difference ?

Conclusion

Let students come to a conclusion that

1. All green plants make their own food.
2. The green leaves need sunlight, and water to make food for the plant.

Do on your own (Teacher may give the following as an additional activity)

Put water in two aluminium pans. Put a wet plastic sponge in each pan. Put 4 bean seeds in each sponge. Dried beans may be mixed. Put one pan in a dark cupboard. Put the other pan where it will get plenty of sunlight. Add water to both pans, when necessary, to keep the sponges wet. Soon the seeds will sprout and new bean plants will grow. Study the seed everyday. Ask the following questions.

1. Do the seeds sprout in the dark or only in the sunlight?
2. Which young bean plants grow better, those in the dark or those in the sunlight? How do you know? Do you know why?

Competency 3: identifies the uses of plants.

Uses of plants

1. Plants helps us in providing food shelter and clothing.
2. They make our surroundings look beautiful.
3. They also keep the air clean and fresh.

Activity 23

Ask pupils to name plants, or foods from plants which they ate yesterday. Ask them to make a list of food items that are used everyday in our food. Let them arrive at a conclusion that a great proportion of our daily food consists of plant materials.

Activity 24

Review the parts of roots, stems, leaves, flowers, seeds and fruits that develop from flowers. Then lead into the lesson with the question:

What parts of plants do we use as food ?

(Sweet potato, carrot, beetroot, cabbager, cauliflower, potato, banana). Let students make a list.

Activity 25

Display the following food materials before the students. Ask them to identify the food materials (carrot turnip, beetroot, radish, sweet potato, potato, cabbage, cauliflower, dal, ladies finger, lemon, beans, paddy, wheat, ragi, jowar and so on).

According to locally available plants, the teachers can add the examples. Ask them to identify the above (1) to which part of the plant body do they belong, (2) to classify them under the following heads.

Root	Stem	Leaf	Fruit	Flower	Seed

Through discussion and observing the plant materials, pupils should reach the following understandings:

1. We use many kinds of plants as food
2. We eat different parts of different plants
3. We eat roots, stems, leaves, flowers, seeds and fruits.

Activity 26: Divide the class into three groups and give the following activities to each group.

Activity (1): List out food items (vegetables and fruits) from plants that you eat everyday.

Activity (2): Ask the groups to do the following.

a. List the roots we eat.

b. If possible, bring edible roots, stems, and the leaves from home and hold an exhibition in the class.

Activity (3)

Ask students list out the cereals and pulses that we obtain from plants and to collect cereals like wheat, jowar, paddy, ragi and grams like bengal gram, green gram, peas, dals, horsegram and so on, in small quantities and seal it up in small plastic covers and staple them on a thick card board. Ask them to write the names of the cereals and the grams underneath each plastic bag and hang the chart on the wall of their classroom.

Activity (4)

Ask students list out the fruits that they eat and the fruits that they know.

Discuss

1. Why should we eat vegetables and fruits ?
2. What would happen if we don't eat vegetables and fruits ?

Activity 27

Ask pupils to identify the animals shown in the picture (in groups). Ask what kinds of foods are the animals eating ?

What parts of plants do farm animals use as food?

Guide pupils' observations towards the following:

a. The ducks and chickens are feeding on grain (seeds).

b. The cows and the sheep are eating grass.

c. The rabbits and squirrels are eating grass.

d. The parrots are eating the fruits and nuts.

e. The monkey is eating the nuts.

f. Deer graze as cattle do, on grass and other green leaves.

g. Elephants are also found feeding on wild grasses and other plants.

* By the end of the lesson pupils should be able to express the following in their own words:

Various plant parts - roots, stems, leaves, flowers, fruits and seeds - are used as food.

- **We use plants as food.**
- **Farm animals use plants as food.**

- Many other kinds of animals also use plants as food.
- We get valuable wood and timber from the plants that are useful for building houses and for making furniture.
- We get fibre from some plants. Fibre helps to make clothes, ropes, coirmats and bags.

Activity 28: Identify the plants from which wood, timber and fibre are obtained.

Name of the plant	House building/ furniture	Clothes	Doormats/ bags/ropes	Others uses
Teak				
Rosewood				
Neem				
Sandalwood				
Cotton				
Coconut				

Activity 29

Ask students to observe the classroom and identify the things made of wood.

From some plants we can extract medicines. For eg, leucas and ginger cure cold and cough. Neem is used for treating skin and stomach problems. Cinchona is used to cure malaria.

Find out

Discuss with your parents and grand parents and find out some of the home medicines in which plants are used as medicines. Make a list of diseases and the related home remedies against them in which a plant or plant product is used.

Activity 30

Ask students to find out the names of the flowers of the plant which are used as vegetables (cauliflower, flowers of banana plant).

Competency 3: identifies the methods of dispersal of fruits and seeds.

To enable the students to know the methods of dispersal of seeds and fruits, the existing information in the book and in the teachers handbook may be used.

In addition, ocal specific examples for seeds/fruit dispersal may be given by the teachers.

Competency 4: understands the methods of proper care of plants and conservation of plants.

Activity 31

Ask students to (1) find out the details regarding the care of the plants from the parents. (2 list out the natural and artificial fertilisers. For example,

(a) How does one plan the garden ?

(b) How and when to sow the seeds ?

(c) What conditions have to be provided for the plants growth ?

(d) What should one do to protect the plants from insects, pests, and other grazing animals ?

(e) How to remove weeds ?

(f) What natural fertilisers can be added to the soil ?

(g) What are the artificial fertilisers that can be used ?

Activity 32

Teacher can take the students out on a field visit to a nearby farm and make students to find out from the farmers about the care and maintenance of plants, fertilisers used, name of the artificial fertilisers and so on.

Extended Activity

Ask each group to bring a potted plant and keep outside the class (on the veranda) or on the window sill, and each one to take care of the plant by watering the plant everyday, and mannuring the plant and so on. Ask them to take observations regarding the growth of the plants.

1. number of new branches
2. number of new leaves
3. colour of the older leaf and the new leaf
4. buds and flowers, their colour
5. size of the plant and so on.

LESSON 4

STATES OF MATTER

Competency 1: Classifies the different states of matter.

Activity 1

Ask the following question to the students and write their responses on the Black Board.

- Can you think of something that is hard and that has its own shape ?
- Can you think of something that you can pour ?
- Can you think of something that spreads out and has no shape at all ?

Based on their responses, introduce the terms solids, liquids and gases.

Activity 2

Show certair substances and ask the students to classify them according to the different states of matter. For example, water, juice, brick, bench, ink, chalk piece, perfume sticks, perfume, etc. Point out to the substances present in the classroom itself and ask them to identify the states of matter.

Activity 3

The students can be asked to identify the substances that are available in his immediate surrounding and classify them under solid, liquid and gas.

Competency 2: Understands the changes of matter.

Activity 4 (Riddle)

Put the following riddle before students and ask them to find the answer.

Sometimes it is hard and has its own shape.

Sometimes it can be poured.

Sometimes it spreads out and mixes with the air.

WHAT IS THAT ?

(The answer is water)

Congratulate the students if they have given the right answer, and do the following activities.

Activity 5

Take a kettle and allow water to boil and hold a slate near the water vapour and make the students see the vapour getting cooled down.

Activity 6

Refer to the teacher's guide (instead of a test tube, a Horlicks bottle can be used) or any other container that is easily available.

Activity 7

Ask students to burn a candle and observe what happens. The wax melts and becomes liquid, and on cooling becomes a solid.

Activity 8

Take naphthalene in a test tube and put in a beaker containing hot water having a temperature of students 80°C only. Ask the students to observe. The naphthalene vaporises giving a very strong smell.

Activity 9

Take iodine crystals in a test tube and heat it, and observe the violet vapours formed in the brim of the beaker. Draw students attention to the fact that certain solids directly change into a vapour state.

Competency 3: Understands that matter is made up of very tiny particles.

Activity 10

Ask students to conduct the following activity on their own to know that liquid changes into gas.

Things required

Some coloured perfume and a larger milk bottle.

Instructions

Smell the perfume. Then look at it. You know that it is a liquid. It can be poured. It has the shape of the bottle it is in. What colour is the perfume ? (Record it).

Look at the milk bottle. Is it empty or filled with air ? Can you smell anything in the bottle ? Air is made up of gases that we cannot see, taste or smell. The milk bottle that seems to be empty is readily filled with air. Put one drop of perfume into the milk bottle. Now hold the bottle under your nose. You can smell the perfume. The drop of perfume fell to the bottom of the bottle. How does any of the perfume get up to your nose ?

Keep observing the bottom of the bottle and you will find that the drop of perfume has disappeared. It is evaporated. This means perfume has changed from liquid to gas.

Activity 11

Recall the activity where perfume is used. Make students to repeat the activity. Show that the perfume mixes with air (The tiny parts of perfume gas is spread out). Some of them reach the nose, that is why, we get the sweet smell of perfume.

Ask students to give similar examples from their daily life observations.

Activity 12

Provide students with a large bottle and small pieces of mothball. Give the following instructions.

Smell the pieces of the mothball. Put them into the bottle. Smell the air at the top of the bottle. What do you smell ? You can see the bits of mothball on the bottom of the bottle. Yet you can smell them in the air at the top of the bottle. The bits get smaller and smaller. In time they disappear, what has happened ?

Let students arrive at the answer that the mothballs are solids which have changed into gas that is spread out. Some of the tiniest parts reach our nose, therefore we can smell it.

What are the smallest parts ? Explain that the very smallest parts of mothballs or perfume or any other matter are molecules. Molecules are so small that we cannot see them. How do we know they are these ? We can smell the molecules of mothball.

(Answer: The particles of the perfume are so tiny that they can pass through the rubber. These tiny particles are molecules, and they carry with them the properties of the perfume. So one is able to smell perfume in the air of the jar).

Competency 4: Understands water cycle, i.e. how evaporation aided by the sun's heat, supplies water for clouds and on cooling, how it becomes rain drops.

Conduct the following activity to explain the concept of water cycle.

Activity 20

Take a beaker of boiling hot water. Place a round bottom flask with ice cubes, over the mouth of the beaker. Ask student to observe. The evaporated air touches the cool surface of the ice cubes, and drops as tiny water droplets.

Extend the idea to show how the heat from the sun helps the water to change to water vapour and go into air. Clouds form from the water vapour in the air. On cooling it pours back as the rain.

LESSON 5

BIRDS

Competency 1: identifies the different parts of a bird's body that help in flying.

*** A bird is different from other animals, because it has wings to fly.**

Activity 1

Ask pupils to go through the following list of animals and birds, and classify the following examples into animals and birds.

1. Cat, 2. Mouse, 3. Cow, 4. Lizard, 5. Sparrow, 6. Eagle, 7. Dog, 8. Parrot, 9. Crane.

Ask pupils to identify the important features that enable birds to fly.

*** What makes a bird fly ?**

Activity 2

Show the parts of the body of a pigeon or a model of a bird and highlight the important features that make a bird fly (head, pair of wings, boat shaped body, tail, light bones).

Activity 3

Take the students out on a field trip and ask the students to identify the common features seen in different types of birds.

The students should generalise that most of the birds have feathers, have two wings and have two legs.

- Birds have three kinds of feathers.

- Down feathers keep the body warm.
- Body feathers cover the body.
- Flight feathers help the birds to fly.

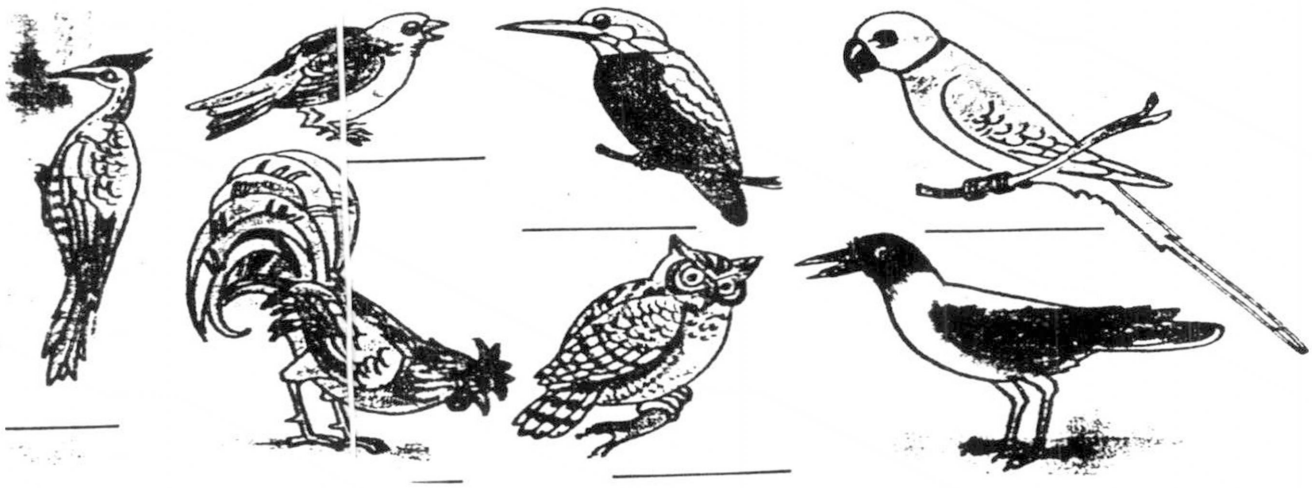
Activity 4

Ask pupils to collect feathers that are fallen in the garden or in the nearby surrounding and the places wherever the birds visit the trees. Ask them to identify the long and small feathers. Explain the functions of the different types of feathers to the pupils.

- Some birds fly very high.
- Some birds fly low.
- Some birds fly long distances.
- Some birds fly short distances.
- Some birds do not fly at all.

Activity 5

Look at the pictures. Name them.



Activity 6

Now group the birds given in the above picture according to their nature of flying.

Fly short distance	Fly long distance	Fly low	Fly very high	Do not fly at all

Competency 2: identifies the adaptation of beak and feet according to the food habits of different birds.

- Different birds have different kinds of beaks and feet adapted to the kind of food they eat.

Activity 7

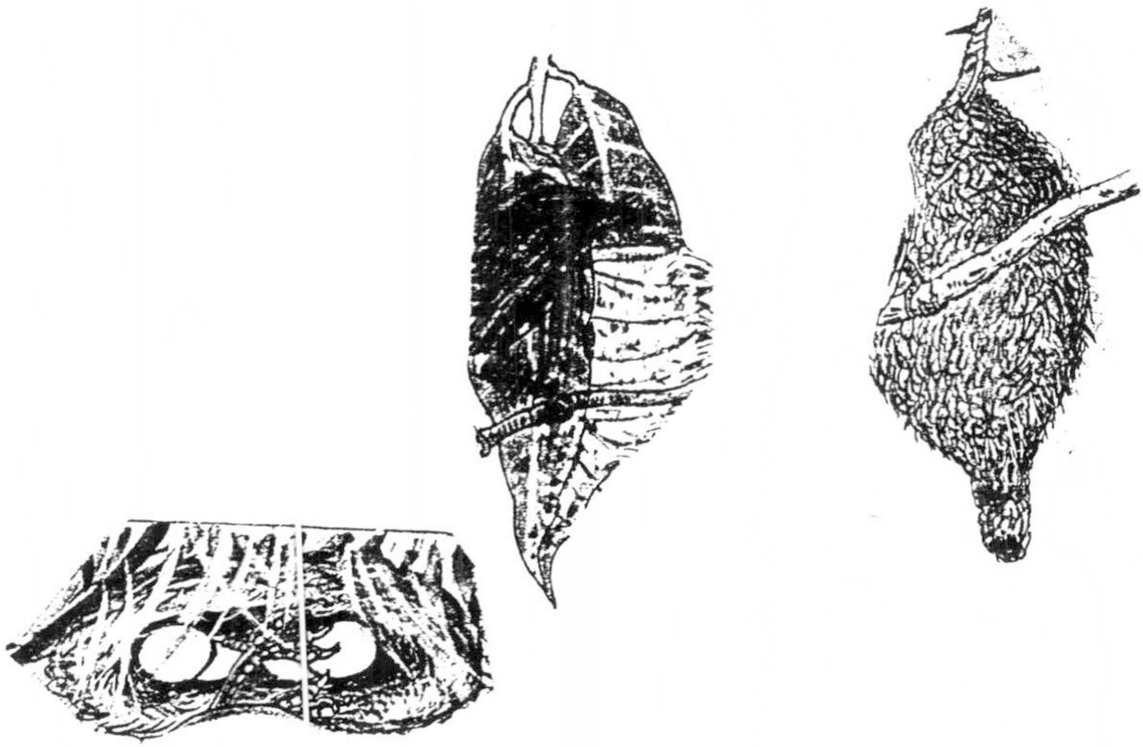
1. Put the cut-outs of different beaks and feet with the sticker at the back side on one drawing sheet.
2. Provide the large pictures of birds each on one sheet (with either the beak or feet missing, but a thin outline of the missing feet or beak should be given, so that it would provide as a clue to the students to match the beaks/feet on stickers.
3. Ask students to identify the appropriate beak/ feet from the sticker sheet and paste it on the large sheet wherever it is appropriate.
4. Ask them to identify the names, and write below the picture of each bird.

Competency 3: identifies the different types of nests and the materials used to build them by different birds.

- Different kinds of birds make their own nests in a particular kind of place.

Activity 8

Ask pupils to observe the following pictures of the different kinds of nests and identify the b rds that built them.



Activity 9

Ask pupils to observe the nests and find out the kind of materials that are used by the birds to build them.

Competency 4: understands the uses of different types of birds to man.

Find out on your own (teacher can give the following questions to students to find answers on their own).

- Why do the birds build nests ?
- What is migration ?
- Why do the birds migrate ?

Activity 10

Give a list of the following birds and ask the students to find out their uses to man (crow, chicken, duck, vulture, pigeon, eagle, peacock).

Activity 11

Ask students to identify the kind of birds that live in the nearby surroundings and the birds that visit their house garden, school garden, or nearby park, and to make a list as follows.

Names of the birds that you have seen:

Names of the birds that you have seen only in the pictures:

Names of the birds that you have heard about, but not seen:

Activity 12

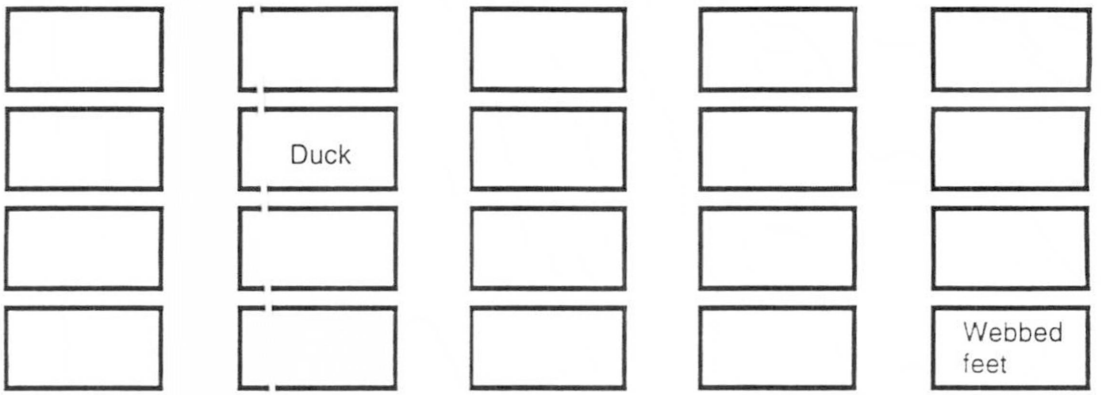
Arrange for a "**concentration game**" through which the students can identify different types of birds, structure of their beak and feet and nests, their uses and so on.

How to conduct a concentration game ?

Concentration is a matching game where students turn over at a time and try to match.

1. Make one set of cards with the questions/parts of the birds body and one set with the answers/the parts of the birds body to be matched. Eight to ten pairs of cards per game is a good number. The cards should all be the same size and colour.
2. Identify each question and answer pair with matching stickers on the same side as the question and answer.
3. Put in a labelled folder with the directions.

Example



Flip 2 cards at a time, if they match you win. Self-checking needs to be on the same side as the writing.

How to play

One or two students may play the game. To start, place all the cards on the table. The first person turns over two cards. If there is a match, he keeps the cards and gets an extra turn. If there is not a match, the card is relieved to the face-down position. The next player then selects two cards. The game ends when there are no more cards. The player with the most cards wins.

LESSON 6

SOLUTIONS

Activity 1

The teacher can ask the students to put the following substances separately in separate containers containing water, and observe which substances dissolve (paper pieces, sugar, salt, sooji, sand, calcium crystals, small stones, chalk pieces, ink, oil, etc. and other locally available substances).

Ask students to record their observations as follows.

Substances which get dissolved	Substances which do not get dissolved

When small quantity of the substances totally disappear in water, then they are known as soluble in water. If some substance remains in water, they are known to be insoluble.

Activity 2

The teacher may give the following instructions before the students conduct the activity.

Ask students to take two tumblers and pour equal quantities of water in them. Ask them to take a lump of common salt (rock/crystal salt) and equal

amount of powdered common salt and put the lump of common salt in one tumbler and the powdered common salt in the other. Ask the question "which one dissolves quickly ?" Make students to record their observations.

Activity 3 (to show that stirring helps in quick dissolving)

Ask students to take two glass tumblers filled with equal quantity of water and add equal amounts of powdered common salt in each tumbler separately. Ask them to stir one tumbler and do not stir the other. Which one dissolves quickly ? stirred or unstirred ? Make students to record their observations.

Activity 4 (to show that heating the water helps the substances in quick dissolving)

Ask students to take two glass tumblers and put some cold water into one and hot water in the other. Ask them to add equal amounts of powdered salt in each tumbler separately and observe which one dissolves quickly.

Teacher can explain further about saturated and super saturated solution with examples of sugar and salt solution.

Activity 5

Ask students to collect a few solid materials available in the house or in the surroundings, and group the materials which dissolve in water, and which do not dissolve in water.

Activity 6 (give the following instructions to the students to conduct the activity)

Dissolve common salt in water in a beaker. Go on dissolving common salt until some of it remains undissolved. Heat the water. Dissolve more common

salt. Now cool the hot solution. What do you observe at the bottom of the beaker ? Write your observations.

Activity 7 (give the following activity to the students)

Take some kerosene in a vessel, and some water in another vessel. Put some tar/paint into it. Does tar/paint dissolve in kerosene or in water ? Write your observations.

Competency 4: understands the methods of separating the solutes from the solutions. (Activity 6 and 7 from teachers handbook may be referred to for separating the solutes from the solutions.)

Activity 8

Ask students to take some common salt and sand and mix them together. Ask them to put them in a glass tumbler containing water. Ask them the following questions.

1. What happens to the sand ?
2. What do you find at the bottom of the glass tumbler ?
3. How will you separate the sand from the salt ?

Let the students hypothesise and plan an activity to be carried out in order to confirm their 'guess' answer.

Activity 9

Ask students to take some common salt and chalk powder and mix them together.

Ask the question "How will you separate the chalk powder from the common salt ?"

Let the students hypothesise and plan an activity to separate the common salt and chalk powder.

Find out on your own (extended activity)

Common salt is obtained from sea water. How is it produced ? Find out.

LESSON 7

NUTRITION

Competencies:

1. knows about mixed food.
2. understands the importance of balanced diet for a good health.
3. understands the ways of obtaining nutritious food.

Activity 1

Ask the students to make a list of food items that they eat everyday. (What food do they eat in the morning, during the day and at night ?)

	Food eaten
Morning Noon Night	

Activity 2

From the above list, the students may be asked to identify the food items which give energy, protects the body, and helps in growth of the body (carbohydrates, proteins, fats, vitamins). Before this activity, explain the types of food.

Activity 3

Teacher may list out a number of food items and ask the students to classify them as energy giving food, body builders and body protectors.

Food items	Energy giving foods	Body builders	Body protectors

Activity 4

Construct a "Wheel of Nutrition game" with the help of which the students can identify the type of nutrient each food has.

Wheels of Nutrition

1. This can be created with one or two wheels. To design a single wheel of nutrition, draw and cut a creative shape approximately 4" x 5" in width. Shapes can correspond to subject area.
2. Cut out the view window, which will be approximately one inch by 1/2 an inch.
3. Cut a 3" circle that will rotate behind the shape. Position the wheel so it rotates past the view window. Depending on the skill, you may need the view window on the right, left, top or bottom.
4. Poke a hole in the centre of the circle and in the shape. Attach with a brad.

5. Add words (carbohydrates, proteins, fats, vitamins and so on) and pictures (vegetables, pulses, cereals, fruits) with the wheel in place. This will help to keep the spacing correct.
6. You can write the answers to the game directly behind the view window.

Activity 5

Teachers can list out a number of food items and ask the students to make mixed food required for a person which has all nutrients.

Teacher can state that the food items containing all the essential nutrients in definite proportions according to age and sex is called 'balanced diet'.

Activity 6

Have the students study the group of foods and know the groups of food (carbohydrates, proteins, fats, vitamins and minerals) mixed food and balanced food. Then present the following questions.

1. Why is it important to have nutritious food ?
2. What would be like if we don't eat food like rice, chappati, dhal, vegetables, fruit, milk and so on ?
3. What would happen to our school work ?
4. Would we enjoy running and playing games ? How would we look ?

Demonstrate to show how children who lack energy would sit and move around. Choose some volunteers to show the behaviour of children who are vigorous.

Ask the question "What makes the difference ?" What do your bodies need to give you the energy; need to keep going - to move around, to work and play ?"

Let the children discuss and realise the importance of nutritious and balanced food for good health.

Activity 7

The students can be asked to make a small survey on their junior class students to find out what type of food they eat every day, and whether it is nutritious and balanced diet. The students can conduct this activity initially with the help of the teacher for few cases.

Activity 8

Students can be made to observe his fellow classmates for any noticeable patches on the body, cheeks and other deficiency diseases, etc. (mouth sores, anaemia, discoloration of the nails, paleness of the skin, severe hair fall, scaly skin) and find out what kind of food they eat everyday. The students can

be asked to identify from the collected data "the missing food" due to which the students are probably suffering from certain deficiencies.

Teacher can discuss the reasons of such deficiency diseases later.

The activities 3 and 4 may be carried out from the teachers hand book to indicate that the balanced diet differs according to a person's age, state of health and the kind of occupation in which one is involved.

Activity 9

Ask students to visit the market place and observe different food items sold there. Ask them to make a list of 20 food items and group them into energy-giving food, body- building food and protective food.

Activity 10

Ask students to plan a weekly food chart for their age group from the locally available food stuffs, and select food stuffs from all the three food groups.

Activity 11

Ask the question "Why do boys and girls of your age need some food from each group of food everyday?

(Through discussion help students to reach the following understanding and express in their own words.

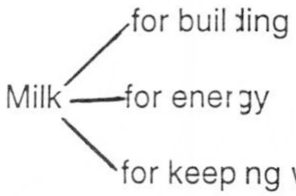
PROTEIN—helps our bodies repair any part that get hurt / we are growing

FAT ———————— keeps us active

CARBOHYDRATE —gives us energy

VITAMINS —— to keep well

MINERALS



Following this, ask them to collect pictures of different types of food and make an album under each group of food, and write the benefits in a column against the food group as follows.

Activity 9

Teacher can show a list of pictures drawn on a chart and ask the students to group them in three groups.

Food eaten only after cooking	Food eaten raw	Food eaten both cooked and raw

Activity 10

Ask each student to write something important about himself and how he is growing. They may be asked to give titles such as "I am growing", "How I grow", "I am bigger now", etc. If possible, ask them to stick their photographs taken from early age, till the present and write wonderful stories about themselves.

LESSON 8

SOIL

Competency 1: identifies different types of soil and their capacity of holding (retaining) water.

- Soil comes from rocks.

Activity 1

Ask students to take two stones and rub one against the other. Ask them to collect what falls from them, and also observe the rubbed surface of the stones. Ask them to examine the powder with the help of a hand and compare with the size of the stone. Ask them to record their observations

Following the Activity 1, ask the following link question "We prepared soil by rubbing two stones. Does such a thing happen in nature ? or who makes soil in nature ? Wait for students responses and then explain that the rocks break into small particles due to the continuous action of sunlight, rain, frost, acids, and wind. These smaller particles of rock become soil. It is a very slow process and takes many many years.

- **Concept: Kinds of soil**

a. Sand : if the sand particles are more and soil is white brownish in colour.

b. Clay : if the clay particles are more and soil is black in colour.

c. Loam : It is a combination of sandy and clayey soil and silt. Eg. Garden soil

Activity 2

Ask the students to collect samples of soil from the school ground, roadside and garden in different plastic bags. Ask them to observe the colour, touch, and see the size of the particles in each of them. Ask them to record their observations in the following table.

Instruction: Collect the above three soils and record your observations, and also mention from where they have been collected, place from where the soil is collected.

Teacher can demonstrate the activity to show the types of soil and then instruct the students to do the following activity.

Place from soil obtained	Colour	Size	Types of soil

Activity 3

Ask the students to put the soil collected from different places in a glass beaker. Ask them to mix them well, and pour water into the beaker. Ask them to stir the mixture, and allow it to settle. Ask them to observe the way the soil settles.

- Explain the types of soil by pointing out to the larger particles of sand which settles at the bottom; the smaller particles of clay that is suspended in

middle; and the top soil that is called humus. Explain to them that a mixture of sand, clay, and humus is called loam.

- Sand allows most water to pass through.
- Loam holds water enough and allows the remaining water to pass through.

Which soil allows most water to pass through ?

Which soil holds the water most ?

Teacher can demonstrate the following activity to show the water retentivity of different types of soil.

Activity 4

Ask one group of students to take three plastic bags of equal size and make a small hole at the bottom of each bag. Ask them to fill one with sand, the other with clay soil, and the third with loam. Ask the other group of students to hold a bag each, and keep a beaker below each of the holes, and pour equal quantity of water into each bag. Ask them to observe and record in the following table.

Water retentivity	Bag 1	Bag 2	Bag 3
Time taken by water to come down			
Quantity of water collected in the beaker			

Activity 5

Take three conical flask and three funnels. Put sand, loam, clay into each of the funnel. Add 100 ml of water to each of the funnel put on the conical flask. The water retaining capacity of the soil can be demonstrated them.

The students can be asked to observe for five minutes and make them record their observations.

Activity 6

Ask the students to conduct the following experiment.

Take three glass beakers of equal size and three small funnels. Plug the funnels with cotton. Now put some sand in the first funnel. Put an equal amount of clay in the second funnel and loam in the third funnel. Add equal amount of water to each funnel. Collect the water that comes dropwise from each funnel. Find out which soil holds the water most ? and which soil holds the water least ?

- Different kinds of crops grow in different types of soil.

Activity 8

Ask students to discuss with their parents and find out what kind of crops grow in what kind of soil, and make a list of them.

Activity 9

Ask students to visit different farms and fields in their locality, and enquire about the types of crops grown there, and complete the following table.

Sl.No.	Crop	Types of soil
1	Maize	
2	Groundnut	
3	Tomato	
4	Cotton	
5	Mustard	
6	Sugarcane	
7	Coconut	
8	Toddy palm	
9	Paddy	
10	Millets	
11	Ragi	

Activity 10

Ask students to list out the other uses of soil.

Do on your own (how to prepare a good soil for your garden or a pot)

Ask students to prepare loam soil. Loam soil can be prepared by adding equal amounts of sand and clay. Then ask them to add humus and mix well. Highlight that this kind soil is best for the growth of plants, and this soil can hold enough water and air for the use of plants.

Additional activity

Encourage the students to collect soil samples from various places and then help them to set up a soil exhibition. Each sample might be labelled and placed on a paper plate. Provide them with magnifying glass to see and compare the soil collected from different places.

Teacher can also encourage students to develop a small school garden.

LESSON 9

FORCE AND ENERGY

Competency 1: understands that force is necessary to move an object, alter the direction of the motion, speed and the shape of the object.

- **Force is necessary to move an object**

Activity 1

Keep a small stone on the table. Ask a student to push it with one of his fingers. Why did not it move before he pushed ? Why does it move when it is pushed ?

* Explain that force is necessary to move an object.

Activity 2

Keep a brick or a heavier object on the table. Ask a student to move it. The student may find it difficult to move the object with a finger. Perhaps he can move with his hand !

** Explain that more force is necessary to move a stationary object.

Activity 3

Is it possible to move the wall of the class room with human hands ? Though force is applied on the wall when we try to move with our hands, the force is not sufficient

** Explain that a huge machine can do the work of moving a wall, because the force applied will be large).

- **Force is necessary to stop a moving object**

Activity 4

* How do you reduce the speed of a moving cycle ?

Ask students to keenly observe the use of the rubber blocks used in the braking system of the cycle.

** Explain/try to get the response from the students about the working of the brakes in a cycle.

Extending the idea

How is a moving car/train can be stopped ?

- **Force can be used to alter the direction of the motion**

Activity 5

Roll a marble towards a student. Let her/him put the hand to be in its path and see the change of direction of the marble.

Extending the idea

In the volley ball and foot ball games force is applied by the players to change the direction of the moving ball.

- How do you change the direction of a moving cycle ?

Explain the underlying principle.

- Force is used to change the shape of the object.

(Refer to the activities in the text book and the teachers handbook)

Extending the idea: Teacher can discuss the work done by blacksmith and goldsmith.

Competency 2: understands the different types of energy.

*** Energy**

Energy is required to give the necessary force to set an object in motion or to alter its motion. Different types of energy may be used to set an object in motion.

Mechanical Energy

Activity 6

Show some toys with "key mechanisms" fitted in them. What makes the toys move ? Suppose a key and a toy were there will the toy move ? What should you do ? The response may be, we have to wind the spring in the toy with the key. So mechanical energy is being given to the toy by the human hand and the human sets the energy from the food he/she eats.

You may cite similar examples as many as possible.

Example, How does a cycle moves when you ride it ? And other examples like sewing machines, typewriter may be cited.

*** Moving air has energy**

Activity 7

Ask the children to blow a rubber balloon. When there is no wind motion in the classroom, keep the balloon on the floor. Why the balloon does not move ? What can we do to it to make it move ? Perhaps one can blow air on the balloon ! Where does the energy come from ? Ask students to do the activity and find out for themselves.

Activity 8

Ask students to observe their environment, when the wind blows (mildly or severely) and list their observations as follows.

- Wind blows things around.
- It can pick up dust and leaves.
- The wind can lift people's hats off and carry them away.
- It can push over houses, and pull trees up by their roots.

Put the following question.

* Where does the air get all this energy ?

* What makes the air start to move ?

** Explain the concept of hot air and cold air.

(Heat energy from the sun warms the earth. Some places get hotter than others. The air above the hot places get hot too. As the air gets hot, the molecules move faster and farther apart. The hot air rises, and the colder air blows into take its place. As the hot air goes higher, it cools off. Then down it comes, and more hot air goes up. The sun's heat makes air move. Moving air can be used to turn wind mills, to push boats, or to turn cardboard wheel).

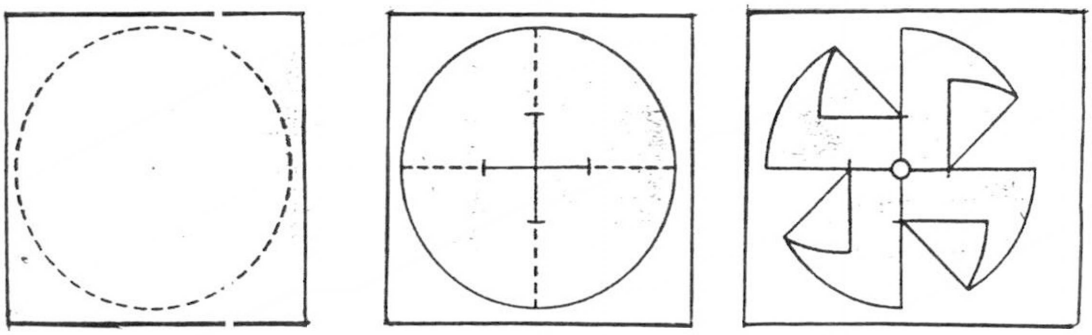
Activity 9

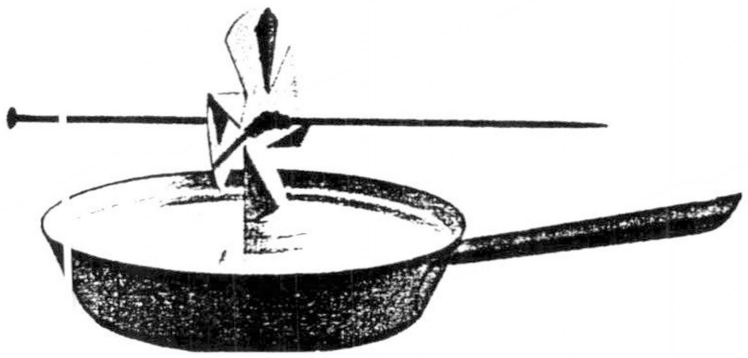
Ask students to make a cardboard wheel as follows.

Things needed: (a large piece of cardboard, a knitting needle).

Instructions to carry out the activity

Cut out a round piece of cardboard from a large carton. Then make four cuts and folds as shown in the picture.





Push a knitting needle through the middle. You now have a wheel on an axle. Make sure the wheel turns freely on the axle. Try to find ways to make the wheel turn by using energy from moving air. How many different ways can you think of ?

Find out what happens when you do the following things:

1. Take the wheel outdoors when the wind is blowing.
2. Take a deep breath and blow on the wheel.
3. Fan the wheel with a large cardboard or hand fan.
4. Hold the wheel in front of an electric fan that is running.

Ask students to perform the above activities and record their observations. Hold a discussion later.

Activity 10

Ask students to make a kite and try to fly. When will it fly high up in the sky ? Ask them to observe and come out with answers for a discussion in the class.

*** Heat Energy** (Refer to the activities given in the teachers hand book)

The teacher may ask the students to list out the activities for heat energy or where heat energy is used.

Activity 11

Ask students to keep a glass of water in the sunlight, and observe. Hold a discussion in the class about sunlight being one of the sources of heat energy.

Ask students to collect examples of heat energy derived from sun and its uses in daily life activities. Draw students attention to some of the activities where heat energy is used like (1) drying the clothes in the sunlight, (2) drying some of the food materials in the sunlight, (3) evaporation of water when heated in sunlight and so on.

Ask students to provide examples of other sources from which heat energy is produced (eg. wood, coal, gas, oil and candle wax).

Activity 12

How can a fuel be used to move a wheel ?

Ask students to conduct the following activity to find solution for the above question with your assistance.

Things required

An aluminium pan, soft clay, a long pencil with a sharp point, three candles about 4 inches long, a test tube, a 10" square of aluminium foil, and a pair of scissors.

Instructions

Put the clay in the middle of the pan and stick the pencil, with the point up, into the clay. Put in three more wads of clay about 3 inches from the middle. Push a candle into each of these wads of clay. Make a pin wheel of aluminium foil. Turn the pin wheel upside down and fit it over the tube. Then slip the tube over the pencil. Test it with your finger to make sure that the tube spins around easily. Light the candles. What makes the pin wheel go round and round ? Let the students discuss and arrive at a conclusion that the heat energy from the candle has helped the wheel to move.

Extending the idea

Ask students to observe the vehicles on the street for a few minutes (scooter, autorickshaw, car, bus, van, lorry and so on). If this is not possible, automobiles might be introduced verbally as a topic for discussion.

What makes a scooter or a car go ? Could this vehicle just keep on going without stopping ? Why not ?

By probing with questions, you can help students to realise that once the petrol tank is empty, the vehicle will stop. Through discussion, help students to

realise that neither the battery, the key, the driver, nor the motor makes the vehicle go. For this energy is needed, and the energy comes from a fuel petrol.

Additional Activity 13

Suggest that students make pictures of things that are being moved by energy from a fuel. If necessary, remind them that aeroplanes, automobiles, trucks, motorcycles, ships, etc. burn oil or gasoline in their engines. Both of these fuel substances come from petroleum.

*** Chemical Energy**

Ask the following question to the students "what happens to the food we eat ?

Activity 14

Ask students to hold their hands in front of their mouth and breathe out against their hand. Ask "Is your breath warm or cold ? Is the air you breathe out warmer or colder than the air around you ?

Make them realise that their body is giving off heat that makes their breath warm.

Ask students if they have held a pet dog or a bird or a kitten ? What did they feel ? (elicit the answer 'feel the warmth of the body').

* "Where does the heat in its body come from ?"

Ask the following question

* If your mother or father have used a thermometer to take your temperature, you may know that it should be about 98 degrees. Where does so much heat energy in your body come from ?

**** Explain the following**

Heat comes from the food you eat. The food goes through many changes in your body. As the food changes, heat is given off. Your body stays warm. From the time you wake up in the morning, until you go to bed at night, you are busy doing something. How are you able to move ? or do work? Nothing moves without energy. Your body gets energy from food, just as an automobile gets energy from petrol. Food and petrol have stored energy. When the stored energy in the petrol changes, it makes the vehicle go. When the stored energy in food changes, it makes you go. Energy makes you grow also. (Ask students to compare themselves - height, weight, etc. when they were in 1st standard with the height and weight of their body now.

Activity 15

Burn a magnesium ribbon. Ask students to observe the changes and record the same. Ask them to identify the energy used in this.

Activity 16

Similarly, provide a list of the following objects, and ask students

* What happens when the following objects are burnt ?

a) match sticks

b) wood

c) crackers

d) papers

e) cloth pieces

From these activities, help students to infer that chemical energy is taking place.

LESSON 10

IMPORTANT FUNCTIONS OF OUR ORGANS

Competency 1: understands that the heart pumps blood through the body.

Competency 2: understands that the heart beats many times per minute.

Activity 1

Obtain a model of the heart and describe the chambers, the way they are arranged, and location of the heart.

Activity 2 (to know the size of the heart)

(This activity should be done in a group of four children)

Ask the students "How large is your heart ?" Have the students make a fist, and tell that this is approximately the size of the heart.

Activity 3:(Provide the materials to students to conduct the following activity)

Obtain a model of the heart, Y-shaped tube, a funnel and two rubber tubes. Make a stethoscope by attaching rubber tubes to the three ends of a Y-shaped glass tube Attach a funnel to the tail of the Y tubes.

(A small funnel with one rubber tube can be substituted if a Y tube is not available).

(give the following instructions)

1. Place the funnel on the chest of your friend.

2. Place the other two ends in your ears.

Caution: Use extreme care when placing the tubes in your ears so you do not harm the ear drums.

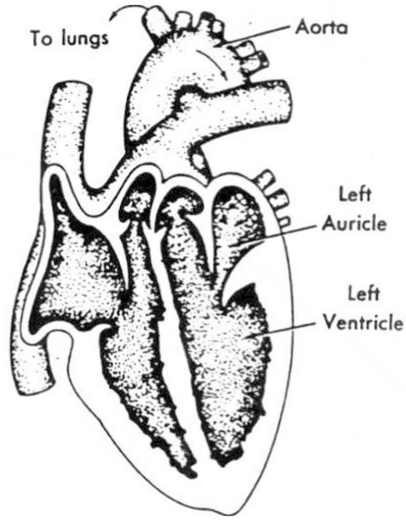
(Ask the following questions)

What do you hear ?

Why do you think the heart sounds something like a drum ?

What makes the drum noise ?

At this point, display the model or a large chart of the heart and ask the students to identify the various parts of the heart and their functions. Trace the route of blood through the heart.



Activity 4 (Balloon experiment to demonstrate how the heart pumps blood)

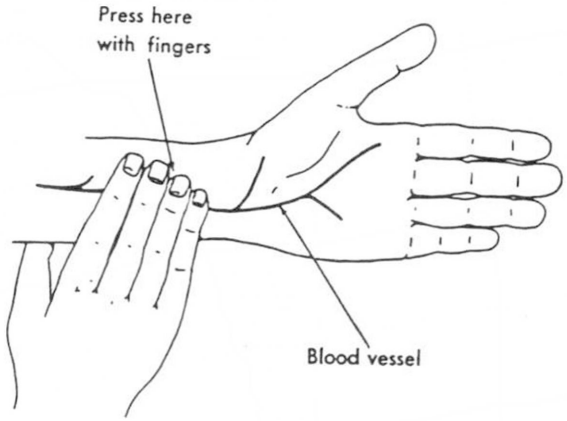
(The students may be asked to conduct the following activity on their own to understand how the heart pumps the blood).

Ask students to obtain a balloon and fill the balloon half full of water. Tell that the water in the balloon represents blood. Ask them to gently press one end of the balloon and push some of the liquid out of the balloon.

(Teacher's note: The heart is similar to the balloon in that it has liquid in it, but the heart actually has two pumps, one on the left side and one on the right side. The sound what the students hear, is due to the pumping of the heart).

Activity 5

Ask the students to feel their pulse as shown in the diagram.



Ask the following questions:

* What do you feel ?

* What causes the beats you feel ?

** Explain that pulse is caused by the surge of blood that passes through the blood vessels each time the heart pumps.

Activity 6

Ask students to divide into groups and listen to their group members pulse and record the number of heart beats per minute. Then ask them to

jump up and down 15 times or run for some distance, and record the number of heart beats after that.

Explain to the students as follows:

** When you exercise, your muscles use more oxygen and food energy. Your heart is stimulated because of this activity, and it pumps faster, sending more blood to all parts of the body.

Activity 7

** State that every twenty five seconds, the blood is sent throughout the body. After this information, pose the following problem.

* How many round trips has your blood made since this time yesterday ?

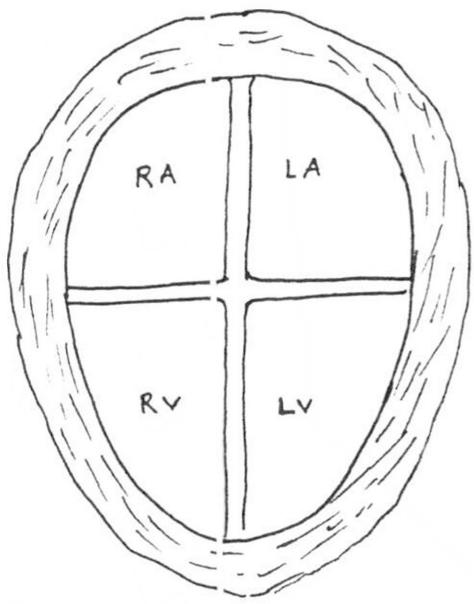
Activity 8 (Extended activity)

Teacher can make a model of the heart using the split tender coconut.

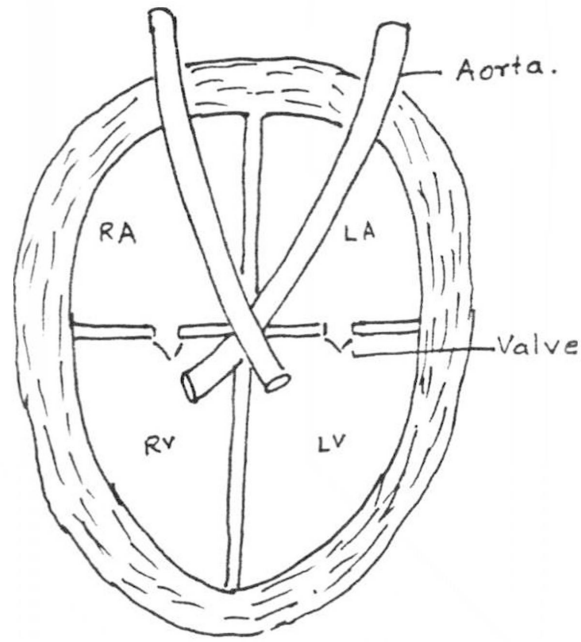
Model of L.S. of heart

1. One half of the coconut shell by splitting longitudinally is used for preparation of model (preferably dry piece).
2. Inner surface is cleaned and painted with flesh colour.
3. The cavity is partitioned into four chambers using colour clay (plastacene) as shown in diagram.
4. The top chambers are auricles and the bottom two are the ventricles.

MODEL OF HEART



1



2

5. Between left auricle (top chamber) and left ventricle (bottom chamber) a hole is made and paper flaps are fixed which act as valves and similar thing may be done between right auricle and ventricle.

6. Two plastic tubes are placed, one running from left ventricle and other one from right ventricle which are aortae.

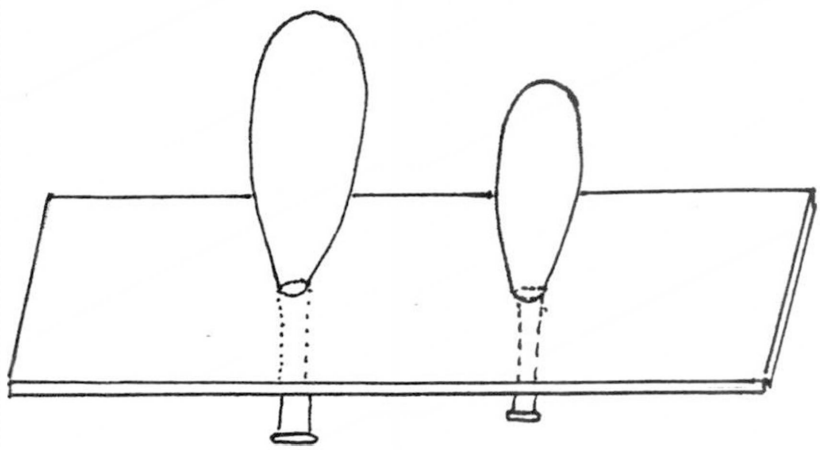
7. Parts can be labelled by using pieces of paper and pasted to that particular part.

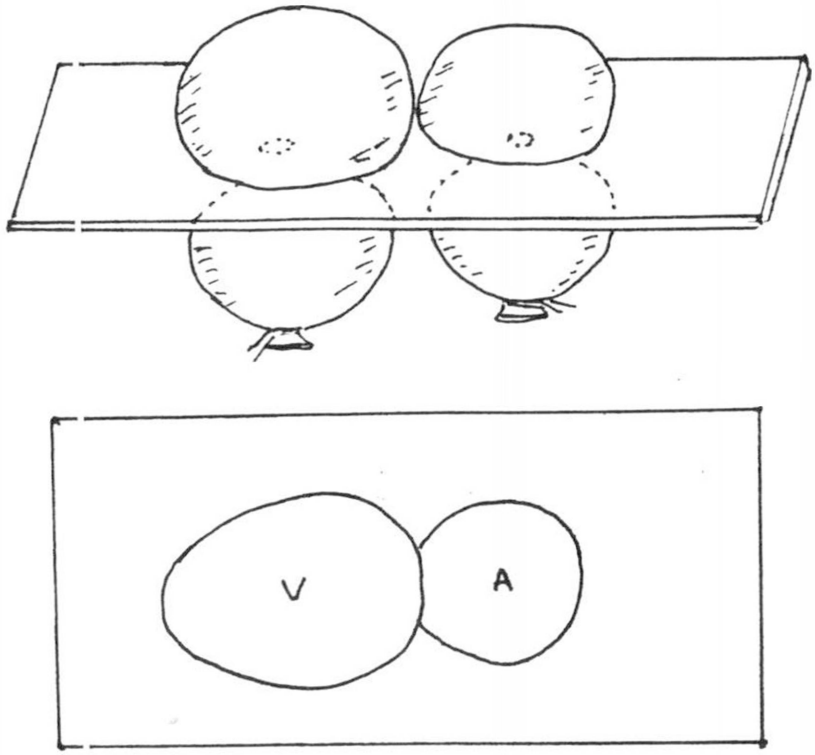
8. The model can be supplemented with a chart showing the diagram and a write up, about the structure and functioning of heart.

Activity 9: Model showing beating of the heart

1. A cardboard of 9" x 12" size is pasted with a colour paper.
2. Two medium sized holes (1" in diameter) are cut on the board and edges are smoothened.
3. Two balloons of different colours are passed through the holes in such a way that part of the balloon are on the upper side of board and remaining parts with mouth on the bottom of cardboard.
4. Air is blown into balloons to bloat them on both upper and under surface of cardboard. Tie the mouth of balloon with thread.
5. Paste "A" label to one balloon and "V" label to another.
6. Squeeze the balloons from the bottom of cardboard alternatively, which makes the balloons to expand and contract alternately on the upper side which can be compared to diastole(expansion) and systole (contraction) of heart chambers.

MODEL SHOWING HEART BEATING





7. Model can be supplemented with a write up and a diagram on the chart.

Competency 3: understands the role of lungs in breathing.

* How many times a minute do you breathe ?

How would you go about finding out ?

To find out the answer, the following activity should be done in groups of three or four students. For exercise the students may be asked to jump up and down.

Activity 10 (give the following instructions to the students)

Do the following with your group member. Record the number of times he breathes when he is at rest, and after he exercises, and record as follows.

	At rest	After exercise
One minute		
Two minutes		
Three minutes		

Let your friend also record the number of times you breathe.

Ask the following questions.

- What is the average number of times a person breathes per minute at rest ?
- What is the average number of times per minute a person breathes after exercise ?
- What makes a person breathe faster ?
- Why did you count the number of times a person breathes ?
- What do you breathe in ?
- What do you breathe out ?
- How does the size of your chest vary when you breathe ?
- How would you find out ?

To answer the above, ask students to conduct the following activity.

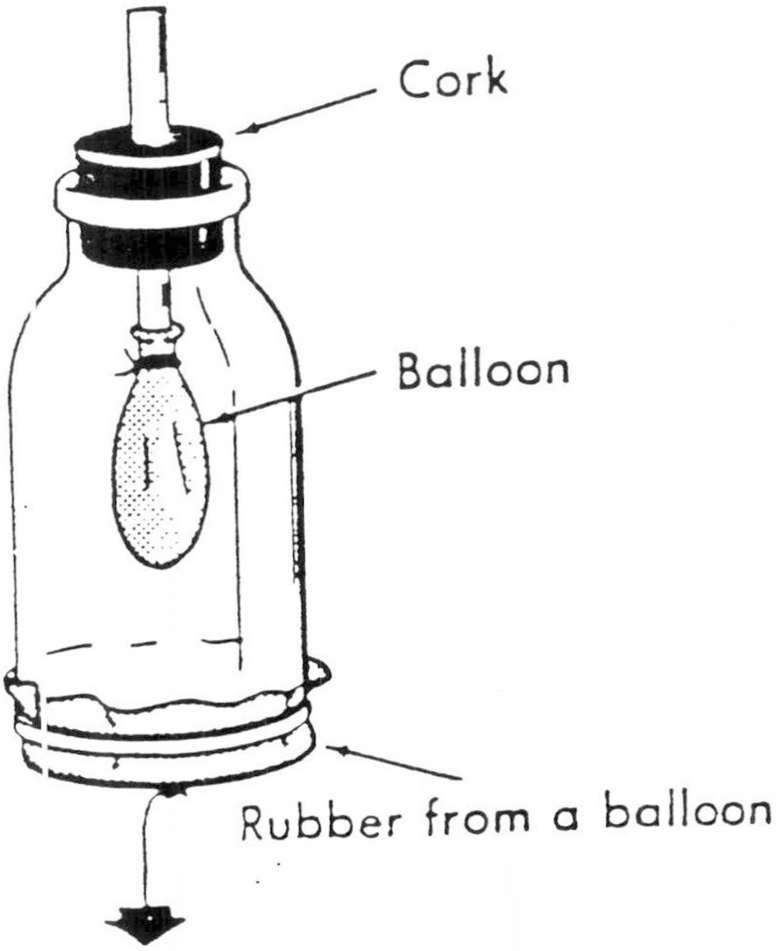
Activity 11

Ask students to measure the chest with the tape, and record the measurements. (The students may do this for one another in the group).

	Top of chest	Lower diaphragm
Inhale		
Exhale		

Activity 12 (to illustrate the idea more in detail, the following model may be prepared and the activity may be demonstrated).

1. Obtain a glass jar, glass tube, cork or rubber stopper, rubber sheet, string, and some sealing wax.
2. Fit the stopper into one end of the jar, and insert the glass tube with the balloon tied on it through the hole in the stopper. Seal any holes around the tubes with the sealing wax.
3. Fix the rubber sheet onto the open end of the jar with a large rubber band.



Ask the question "What do you think will happen to the balloon if you pull down on the rubber cover at the bottom of the jar ?

Ask one of the students to volunteer and pull down on the rubber balloon. Let the other students record their observation.

Ask the question "What do you think will happen if you push up on the rubber cover ?"

Let the volunteer push up on the balloon. Ask others to record their observations.

Ask the following questions:

* Why do you see these changes ?

* Where in your body do you have something that works like this ?

Introduce the word "**diaphragm**". Use a model or a chart of the chest cavity for reference.

Activity 4 (we exhale carbondioxide)

Ask students to obtain a mirror, and exhale on the mirror. Ask the following.

* What do you see on the mirror ?

* Why does moisture collect on the mirror ?

* Where does the moisture come from ?

* What kind of gas is given out while exhaling ?

** Explain that exhaled air contains 80% of nitrogen, 16% of oxygen and 30% of carbondioxide.

Person exhales on mirror

APPENDIX

Group 1

The activities developed by the DIET participants in Environmental Studies II in their groups are presented here. The activities have been planned keeping the competencies and certain essential cognitive skills to be developed in children.

Observation, Collection of Data, Interpreting Data, Drawing Conclusion

Go around the school ground and see how many different habitats that you can find. List the plants you find growing in each. Your teacher will be able to identify the plants you find. How do the plants found in each habitat seem to be adapted for life in that particular place.

Collecting Data Observation

Obtain a chicken foot from a local butcher. Slightly trim the cut end expose the ends of the tendons. Pull on the tendons one by one. Notice that some of them vend the toes and others straighten the toes, what happens to the muscles when a chicken's foot grips its roost ?

Experiment: How can you study the mechanical advantage of a lever ?

Lay a short length of thin wood like a yard stick upon a triangular file so that it balances set a 100 gram weight at one end and a 50 gram weight on the other end. The level is not balanced. More the 100 gram weight toward the fulcrum until the lever is balanced. Measure the distance from the fulcrum to the

centre of each weight. Multiply each weight by its distance from fulcrum. What conclusion seems reasonable ?

Slowly pull downward the end of the liver on which the 100 gram weight rests. How far does the 0 gram weight move when the 100 gram weight moves 2 inches vertically ? What conclusion seems reasonable ?

Collecting data, Observation, Interpreting data, Proposing hypothesis, Testing hypothesis. Drawing conclusions

Obtain an empty aluminium toothpaste sachet and heat it. The tube will bulge then. Open the lid, heat the sachet for some time. Observe it. After some time close the lid and put the sachet on the table what happens ? Why ?

Experimental Inference

Air has weight

Take two inflated balloons and tie it to a glass rod or a broom stick so as to maintain equilibrium among the two balloons by holding the fulcrum. Prick the balloon with a pin so that it bursts out. Infer what happens to the equilibrium status ? and Why ?

Experimental Interpretation

Take a glass full of water (upto the brim) and cover it with a card board. By holding it with the palm invert the glass. Remove the palm what happens ? Why ?

Experimental Classification

Take a battery and connect it serially through a bulb, allowing one end open. Use the following materials available inside the classroom and interconnect the

open ends through that material. Observe what happens. Repeat the same experiment.

1. Rubber, 2. Safety pin, 3. Pencil, 4. Ball pen, etc.

Experimental, Controlling and Manipulating Variable

Is subsoil as fertile as top soil ?

Obtain the following: Two flower pots, samples of sub-soil and top soil, eight bean seeds.

Nearly fill one flower pot with good top soil from a garden or a flower bed (control). Nearly fill the other flower pot with subsoil. Plant four beans seeds in each pot. Keep the flower pot side by side. Give each pot the same amount of water. Keep the temperature and sunlight same for each pot. The variable factor in this experiment is the soil. Divide children into groups and ask them to continuously observe for two or three days. Post the following questions:

Which beans came up first ?

Which soil produced the healthier plant ?

Time Relationships/Counting Number Relation

Take a drawing pin and fix a matchstick on the sharp end of the drawing pin. Place the spherical surface of the drawing pin on the wrist of your hand. Closely observe and count the number of movements of the drawing pin for a minute without disturbance. Multiply the number for an hour.

Experimental Observation/Inference

Take the calcium hydroxide in a glass tumbler, blow your exhaled air through a straw. Place a glass full of calcium hydroxide by its side (control).

Group 2: Standard 4

1. Observation

Lesson 1: Identification of animals with their body parts.

Activity a: By taking the students outside the classroom, students may be asked to observe the animal like goat, horse, cat found there. The students may be asked to show the various parts of the animals. Then bringing back to the classroom, the diagram of legs of various animals may be shown to the students and the students may be asked to tell the name of the animals. Likewise ear, tail, horn may be showr and asked the students to tell the name of the animals.

Activity b: The students may be asked to see various simple machines like scissors, hammer, nail cutter, aracanut cutter, juicer, knife, hand pump and different types of pulleys. Then student may be asked to observe the usage of these simple machines in performing the various functions. There after students may be asked to realise how the machines have simplified the execution of several types of works.

2. Communication

Activity

Students may be taken to school environment to see the birds found there. Then they may be asked to observe the type of beak possessed by each species of bird. In the classroom the students may be asked to form several groups and discuss as the observation made on the beak of birds. Finally they may be asked to explain their observation either orally or by diagrammatically.

3. Counting number relationship

Lesson 3 (Parts of the plants)

In the classroom each student may be given some flower. They may be asked to see and count the number of petch and sepels fond in each flower.

4. Measurement

Lesson 6: Solution

To make the students to understand the concepts on measurement the following activity may be given.

The student may be given some solvent in the measuring cylinder and asked to find out the volume of the solvent given in the cylinder. There after they may be given some quantity of slats and asked to dissolve it in the solvent. Afterwards they may be asked to measure the increase in the volume of solution.

5. Experimenting

Lesson 8

To develop the skill of experimenting among the students, the concept on light penetration is found to be highly relevant. To nurture this skill the following activity may be given. Each student may be asked to take two tumblers. One is made by glass and another one plastic (opaque).then they may be asked to take some materials, say seeds, and asked to see them through the tumblers and ask for their response. The materials taken in the glass tumbler are seen but not materials found in plastic tumbler. From this students may be asked to understand that the light is passing through the glass and not through plastics.

தோற்றம்: 1 புலன் உறுப்புகளின் பயன்கள்

கண் பார்வை

செயல் :-1

சின்றாடம் பயன்படுத்தும் பெண்சீல், ரப்பர், புத்தகம், சீப்பு, கண்ணாடி, பிரஷ், கடிகாரம், சைக்கிள் ஆகியவற்றை மாணவனிடம் காட்டி ஒவ்வொன்றாக மாணவன் அவரைச் சொல்ல சொல்ல பட்டியலில் எழுதி கோட்டு மேடவிட வேண்டும். மாணவன் மீண்டும் நினைவுபடுத்தி சொல்ல சொல்ல ஒவ்வொரு பொருளாக வெளியே எடுத்து வைத்தல். எத்தனை பொருட்கள் அவனால் மீட்டு கொண்டு வரப்பட்டது என்பதன் அளவும் அவன் கண்ணின் பயனை உணர முடிகிறது.

செயல் :-2

ஒப்பனைகளை விட்டு மாணவர்களை

வெளியே அனுப்பி அவர்கள் கண்ணில் பட்ட பொருட்களை ஒவ்வொருவராக பட்டியலிடச் சொல்லல்.

செயல் :-3

மாணவனின் கண்களை கட்டிவிட்டு,

மல்லிகைப் பூ, ரோஜாப் பூ, தாழம் பூ, மல்லிகைகளை ஆகியவற்றை தனித்தனியே எதிரெதிரே வாசனையை நுகர்ந்து கூறச் சொல்லுதல்.

செயல் :- 4

மாணவர்களை வகுப்பறையை விட்டு வெளியே அழைத்துச் சென்று மாறுபட்ட நறுமணங்களை உணர்ந்து கூறச் செய்தல்.

காதின் பயன்கள்

செயல் :- 5

வெவ்வேறு விலங்குகள் [பசு, ஆடு, நாய், பூனை, யானை, சிங்கம், குதிரை] எழுப்பும் ஒலிகளை ஒலி நாடாப் பதிவு கருவியில் பதிவு செய்யப்பட்டுள்ள ஒலிகளை கேட்கச் செய்து அடையாளம் காணச் செய்தல். அதேபோல் பறவைகளின் ஒலிகளையும் இனம் கண்டு அறியச் செய்தல்.

செயல் :- 6

இசைக்கருவிகளின் [நாதசுரம், மிருதங்கம், ஜாலரா, தம்பட்டம்] ஒலிகளை இனம் கண்டு அறிய செய்தல்.

திறன் :- 2 புலன் உறுப்புகளைப் பாதுகாத்தல், தோல் பாதுகாப்பினை மாணவர்கள் மற்றவர்களிடம் கூறுதல்.

செயல் :-

தோலைப் பாதுகாப்பது எப்படி என்று, ஒரு மாணவனை அழைத்து நான்கு வரிகளில் கூறச் செய்தல்.

திறன் : 3 சக்தி தரும் மாவு

செயல் :-

மாவுச் சத்து நிறைந்த உணவுப் பொருட்களை படம் வரைந்து காட்டச் செய்தல்.

திறன் : 4 உடல் வளர்ச்சிக்கான புரதம்

செயல் :-

உணவுப் பொருட்கள் பலவற்றை மாணவனிடம் கொடுத்து அதில் புரதம் பொருட்களை மட்டும் பிரித்தெடுத்து அவற்றின் எண்ணிக்கையை கூறச் செய்தல்.

திறன் : 5 பழங்கள், காய்கறிகள்

செயல் :-

பழங்கள், காய்கறிகள், கீரைகள் ஆகியவற்றை மாணவனிடம் கொடுத்து அவற்றில் பழங்களை மட்டும் பிரித்தெடுக்கச் சொல்லி அவற்றின் எண்ணிக்கையை கூறச் செய்தல்.

திறன் : 6 திரவமான, திடமான, லேசான பொருட்கள்

செயல் :-

மேசையின் மீது உருளை, கோலிகுண்டு, பஞ்சு, புத்தகம், நாணயம், பானை, ஹார்லிக்ஸ் பாட்டில் போன்ற பொருட்களை வைத்து அவற்றில் திடமான பொருட்களைப் பிரித்தெடுக்கச் செய்தல்.

திறன் :

செயல் :-

கண்ணாடி டம்ளர், பீக்கர், பிளாஸ்டிக் பாட்டில் போன்ற பொருட்களில் வண்ண நீரை ஊற்றி ஒரு மாணவனை அழைத்து நீரின் வடிவம் என்னவென்று கேட்டல்.

திறன் : திசை, தொலைவு, ஆற்றல்

செயல் :-

ஒரு மாணவனிடம் ஒரு பேட்டரி செல், ஒரு மின் விளக்கு, இரண்டு ஒயர்கள் கொடுத்து அந்த மாணவனை தம் மின்விளக்கை எரிய செய்தல்.

திறன் : அமாவாசை, பௌர்ணமி

செயல் :-

அமாவாசைக்கும், பௌர்ணமிக்கும் இடைப்பட்ட நாட்களை கேட்டல்.

திறன் :-

செயல் :-

பாம்பு, பல்லி, முதலை, கொக்கு, மயில், காகம், யானை, ஆடு, சிங்கம் ஆகியவற்றின் படங்களைக் கொடுத்து அவற்றில் ஊர்ந்து செல்லும் விலங்கு, பறக்கும் விலங்கு, பாலூட்டும் விலங்கு ஆகியவற்றைப் பிரித்தறியச் செய்தல்.

Training of DIET faculty in

ACTIVITY BASED TEACHING-LEARNING IN ENVIRONMENTAL STUDIES (SCIENCE)

DETAILS OF THE PROGRAMME

22-03-2000

9.30 to 10.30 am	Registration
10.30 to 11.00 am	Introduction
11.00 to 11.30 am	Tea break
11.30 to 1.00 pm	(1) Nature of Environmental Studies (2) Child-Centered Education and Activity based Approach-I **(Dr. Manjula P. Rao)**
1.00 to 2.00 pm	Lunch Break
2.00 to 3.15 pm	Activity Based Teaching Preparation and Demonstration in EVS **(Dr. S.P. Kulkarni and Dr. V.V. Anand)**
3.15 to 3.30 pm	Tea break
3.30 to 5.30 pm	Above session continues followed by discussion

23-03-2000

9.30 to 11.00 am	Child-Centred Education and Activity Based Approach-II **(Dr. Manjula P. Rao)**
11.00 to 11.30 am	Tea break
11.30 to 1.00 pm	Process Skills through Activity Based Teaching and Learning **(Dr. Manjula P. Rao)**
1.00 to 2.00 pm	Lunch Break
2.00 to 3.15 pm	Activity Based Teaching Preparation and Demonstration in EVS **(Dr. Kesavan and Dr. Raghavendra)**
3.15 to 3.30 pm	Tea break
3.30 to 5.30 pm	Group Activity and Discussion

24-03-2000

9.30 to 11.00 am	Process Skills through Activity Based Teaching Demonstration **(Dr. Manjula P. Rao)**
11.00 to 11.30 am	Tea break
11.30 to 1.00 pm	Group Activity and Presentation
1.00 to 2.00 pm	Lunch Break
2.00 to 3.15 pm	Need for Activity Based Evaluation
3.15 to 3.30 pm	Tea break
3.30 to 5.00 pm	Group Activity on Activity Based Evaluation
5.00 to 5.30 pm	Evaluation of the Training Programme by the Participants