PEDAGOGY OF BIOLOGICAL SICENCE PART – 2

(PONDICHERRY UNIVERSITY)

STUDY MATERIAL

UNIT -2

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UNIT – 2

Community and Learning Resources

Syllabus: Learning resources from immediate environment – using community resources – Community based learning resources in teaching of science. – Field visit to botanical garden, Science Park and zoo - scientific Lab and its equipment

Introduction:

The pluralistic and diverse nature of Indian society definitely makes a strong case for preparing not only a variety of textbooks, but also other materials which children can use, enjoy and learn. Teacher with her experience and planning may use many learning materials for designing effective learning experiences in transaction of concepts applying various approaches and strategies. Students feel a sense of ownership to their learning when it is related to their own experiences. Moreover, a stimulated environment of learning biological science demands many resources of learning. All these materials may not be available in the school.

In such a situation the teacher may have to fall back upon resources available in the community. There are a number of community resources that can be used for facilitating the learners in the construction of knowledge of physical science and to find the relevance and meaningfulness of this knowledge in the context of the world beyond the four walls of the classroom. The community resources can be physical or human. These resources can be utilised in two ways— either community can be brought to the class or class can be taken to the community. In fact, teachers, students, administrators and community can collaboratively work to utilise various community resources. In this chapter we shall discuss about learning resources in learners' immediate environment and the resources that could be used with the help of the community. In the latter part of the chapter we shall also discuss on the improvisation of apparatus, science kit and laboratory as learning resources.

Providing learners with learning experiences in relevant situations beyond the four walls of the classroom can give them idea of the context of the concept being transacted along with a sense of environmental and cultural appreciation. It can be an organised field visit or just stepping out of the classroom. Urban schools can have access to science centre, museum, national laboratories, etc. Whether the school is located in urban or rural area, it can utilise the physical surroundings and its immediate environment as learning resource to further students'

interest in science. **Integrating classroom learning with learners' own experiences outside the classroom contextualise their learning.** This promotes learners' creativity, participation and interest in science classroom, which help them to shift away from the rote memorization and have a feel of science.

Limited resources and geography should not be a barrier to meaningful learning of biological science. Information and Communication Technology (ICT) has made it possible for us to contact a person from any corner of the world. Work of the specialist working in various sectors, such as health, transportation, communication, computer technology, machines, art, music, industry, etc. are related to scientific aspects. Their expertise can be utilised for the enrichment of teaching-learning experiences. For this, the teacher would need to have information and idea of the available resources, and the person who is to be contacted. She can take the help of students also to identify the local resources. Using community resources has added advantage of strengthening linkages between the schools and the community. The teachers' ability to plan learners' experiences in a manner that permits imaginative use of such resources directly affects the quality of education schools.

Learning resources from immediate environment

Immediate environment of the learner is a natural learning resource that can be used in making curricular choices. The immediate environment includes physical, natural and socio-cultural world. Learners find acquired knowledge significant if learning of science takes place from the primary context of their immediate environment.

Process of constructing knowledge is a continuous one, which goes even outside the school. It implies that learning is also a continuous process and it has a broader meaning than what takes place in school. Teachers of biological science should appreciate that the environment around the student is full of learning opportunities. They might utilise every conceivable situation for learning process. For example, on the school ground certain things are almost always available such as soil, plants, trees, insects, birds, sunshine and shadows, bicycles and automobiles.

A range of activities can be organised from these things, situations and materials. Students can measure difference in the temperature in the Sun and the shade using a laboratory thermometer to observe that the Sun is a source of energy. They may repeat this activity at the

same time and the same place for a week(s) to analyse the data and learn to plot graph from their own data. The effect of projection angles on the range of a projectile can be shown with a stream of water from a garden hose. A corner of the room may be used to organise learning materials, to keep some appropriate reference and other self-learning materials collected by the students (sample of soils, fabric, magnetic toys, etc.). When some students finish their assigned lesson before the pre-arranged time, they may pick up something from the corner to occupy themselves.

In fact many learning opportunities are available in the school ground/classroom/kitchen/ bathroom/markets/on the roads itself. Outside the classroom, experiences of the learners can be used in teaching-learning of science to provide them first-hand experience for enhanced learning and a sense of appreciation to the environment. It may consist of a wide range of materials.

Learners should be encouraged to construct and reconstruct their knowledge from observing, classifying, categorising, questioning, reasoning, arguing, and interacting with the natural world and people around them. A science teacher should think on the line of flexibility,

contextuality and plurality in designing curricular experiences. In order to relate teaching-learning of biological science with immediate environment of the learners, a number of carry home activities can be identified as an extension of classroom activity. Many such activities can be suggested, such as:

- list some of the changes taking place around you ;
- list acids, bases and salts commonly used in our daily life;
- locate, observe and note down examples of the lever/machines,pulleys, gears used in our daily life;
- list things at home which are good or bad conductors of heat and electricity;
- make measurements (length, volume, area) of some solids and liquids.

Using community resources

Community resources can be used in teaching-learning of science either by bringing community to the class or by taking class to the community (Fig.).

Bringing community to the class

Teacher must explore opportunities for active engagement of the parents and the community in the teaching-learning process of biological science. Different members of the community also hold a large variety of valuable knowledge. Many of these members may be willing to share their knowledge and experience with the students. These members can be invited to school and learners can interact with them. Teacher should remain aware of the range of community, individuals and organizations that can be accessed to provide significant learning experiences to learners. Learners can visit their places of work also. The expertise of members varies from community to community.

Taking class to the community: field visit

In many cases learners can be taken to the community resources of learning. When organised from the point of view of enrichment of teaching-learning experiences, it is a field visit. This makes learning realistic, concrete and interesting. Learners get opportunity to discover the concept and their connection with their environment. They can use this opportunity to learn various skills in interacting with the physical world, materials, technology and other people. It helps students to create knowledge by figuring out the components of objects, events, people, and concept. Let us now see the various advantages of field visits in teaching-learning of science.

Field trips are actually the first-hand study of many things which cannot be brought into the classroom. A well planned field experience can be the most powerful educational tool for the teacher. A field visit should be viewed as innovative activity. A well organised field trip enriches educational experiences of all students learning with different paces and styles. Students should know well in advance that where they are going; why are they going; and what are they going to do, etc. Some field experiences need only a few minutes for completion and can be done within the limit of a class period. Like in the above example, the activity was conducted in the school ground. Usually less preparation and planning are required if visits are arranged within school boundaries.

Some schools arrange field trips that can be as short as a few hours. Most commonly, students are taken to zoos, planetariums, museums, botanical gardens, hospitals and factories.

While evaluating, the teacher should:

- See whether the students are able to relate the field experience to the concept that had already been discussed in the classroom. Teacher should set problems, experiments, review content on the basis of field trip;
- check the observations written by the students in their field diary; and
- Initiate the discussion about what all they have noted in their field diary and what all they have learnt from the field trip.

Advantages of the field visits

The field visit:

- ❖ helps in providing first-hand experience to the students which is not possible within the four walls of the classroom;
- ❖ Enriches general knowledge of students. It supplements the classroom learning;
- ❖ helps in broadening the outlook, deepens insight and widens vision of students;
- ❖ gives the students new ideas and vision for taking up projects;
- ❖ Helps to deepen understanding of the concepts and brings clarity in the subject. It also helps in concretising the abstract ideas;
- ❖ helps the students develop an inquiry attitude towards the environment;
- ❖ develops skills in science processes like observation, collection, classification and analysis of data;
- ❖ brings the awareness that science is all around us and not just in books;
- ❖ relates the community to the learners, teachers and school and encourages sharing of responsibility of child's learning with the community;
- ❖ Acknowledges the authenticity of community knowledge, etc.

Organisation of the field visits

Planning: The entire planning can be done by students under the guidance of a teacher. First a guide sheet can be prepared. It should have learning details, physical details and administrative details.

Learning details: Consist of sites to be visited, data to be collected, list of questions to be asked to the persons working at the site and any process which is to be studied, etc.

Physical details: Route to be taken, time schedule, personal equipments, provisions for refreshments, meals, first aid box, materials to be carried such as umbrella, camera, etc.

Administrative details: Teacher needs to give details, purpose and outcome of the trip for getting permission from the administration of the school for the field trip.

The checklist of a planned field trip can be

- objective of the field trip;
- date of the field trip;
- time of departure;
- date and time of return;
- name of the supervisors accompanying students;
- rules of conduct for students;
- materials students need to bring for the trip, such as water bottle, umbrella, field diary, etc;
- cost for the trip; and
- permission from parents.Transport facility should be also planned in advance.

Prior to students field visit, the place to be visited should be seen by the teacher and a student representative. They should find out, whether learning objectives would be achieved or not. The main aim of the visit should be providing learning experiences; pleasure should be the secondary aim. The objective of the visit should be clear to all learners in order to optimise learning.

Teacher should plan follow-up activities in order to make learning experience, a fruitful one. After coming back from the field visit students can discuss their observations and experiences, ask questions and share photographs. Teacher needs to encourage students to submit the report and mention explicitly what they learned from the visit. Evaluation of the field visit can be done in the light of the planned objectives.

Limitations

- At least a whole is required for the field trip, it is not possible to conduct it in few hours.
- Co-operation is required between teacher and students for its success.

- There can be accidents during field trip.
- There should be enough finances for field trips.

Role of teacher

- First of all the teacher should know about his students as regards to their age, previous knowledge and capabilities.
- The teacher should permission from the college in charge for the fieldtrip. Then he should complete all formalities and obtain permission of the in charge for the place selected for the trip.
- Everyone should be briefed about the main objectives of field trip so as to obtain expected co-operation.
- The teacher should also plan out how he would reply to the queries.
- After the field visits either at the meeting place or in school, time for discussion should be fixed.
- The students should be imparted knowledge of the prior knowledge of the trips.

Precautions during field visit

- The organizing teacher should gather all relevant information about the meeting place. If possible he should visit the meeting place and find out about the facilities and problems of that place. Accordingly he should make necessary arrangements and prepare instructions.
- A suitable and economical vehicle should be used. A first aid kit should be taken along in the vehicle.
- The students should be given necessary instructions to bring torch, phone, tape recorder and camera etc.

The resources maintained by the community can provide great learning experiences for students. These resources if tapped properly can help us in moving from science as an interpretation of visual and auditory symbols (words) to science as an experience. These community resources vary from place to place.

Laboratory as a learning resources

Science Lab and its equipments

Laboratory work can be used as a powerful learning resource of science. **Laboratory work is based on the principle of learning by doing and it is an integral part of science education.** It helps in better understanding of various concepts of science and construction of knowledge. The first-hand experience obtained through experimental work imprints a permanent impression on the mind of the learners. It provides opportunity to the teacher to inculcate various process skills of science, viz. observation, classification, analysis of data, recording, inferring, generalising and communicating. Process skills so acquired help in developing interests, values, and spirit of inquiry that constitute scientific attitude. Students learn while handling, manipulating and innovating different types of equipments.

It provides an environment to learners for exhibiting their qualities such as resourcefulness, initiativeness, orderliness, cooperation, and team spirit. Students enjoy working together with their peers with some freedom of action, having a feel of the excitement of the unknown and achieving a sense of discovery. Of course, learners cannot rediscover all of science; however, encouraging them to observe, investigate and think critically on a laboratory activity can facilitate them to construct some abstract concepts and principles of science, to awaken curiosity about the world around them and to gain a feel and appreciation of science.

Thus, laboratory work facilitates development of (i) cognitive abilities, i.e. principles and laws discussed in the classroom may precede or follow the laboratory work or it maybe carried out during discussion; (ii) process skills of science; (iii) scientific attitude; and (iv) understanding nature of science. Use of laboratory must be focused towards achieving these objectives.

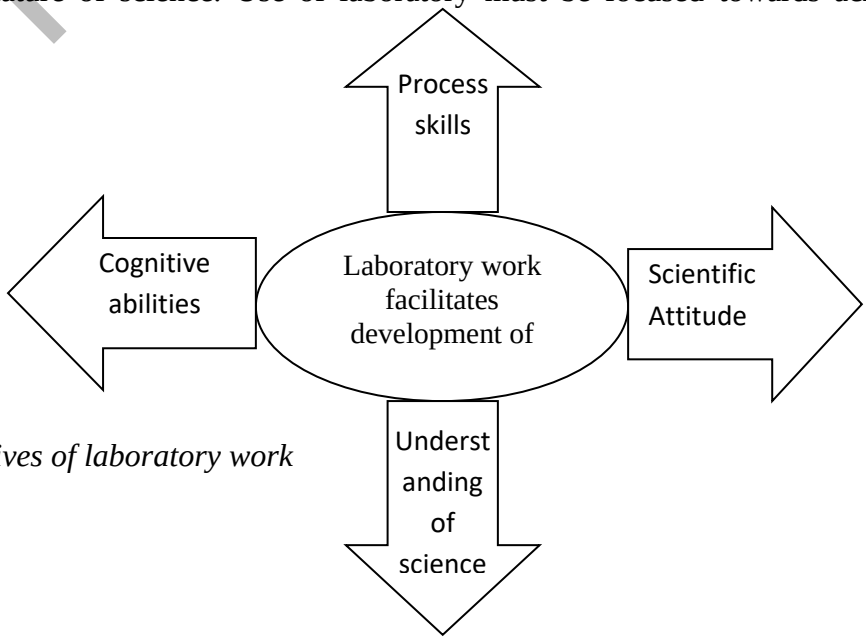

Fig. *Objectives of laboratory work*

Kind of experience that is provided by the laboratory cannot be replaced by any other exercise. **Well-planned laboratory experiences have great potential to attract our young generation into science courses.**

Performing experiments in prescribed fashion and just involving students in hands-on activities do not result in development of inquiry skills in science. Development of inquiry skills cannot be taken for granted as the by-product of the process skills of science. Opportunities to raise question, involving the learners in critical discussion, investigating their own questions and being flexible in the work should be facilitated in the laboratory. Inquiry can be broadly planned considering limited availability of time and crowded classrooms. It is to be kept in mind that emphasis should be given to the first five letters of **LABORATORY** rather than the last seven letters.

Merits of Laboratory

- The student performs the experiment and on the basis of experiment, he attains practical knowledge from theoretical knowledge.
- The students develop self discipline and self confidence.
- The students learn from his experiences. He develops the power of thinking, observation and decision making.
- The students understand the topic clearly and easily
- Favourable atmosphere is created for science teaching
- Working collectively, they develop the spirit of sociability.
- In the laboratory all apparatus and material is available for the experiment, thus the time is not wasted in doing the practical and the breakage of apparatus is minimum.

For organized teaching of biology, the laboratory should have a preparation room, store room biology room and dark room. In the preparation room of laboratory, such apparatus are collected which are to be used in the laboratory of Biology room. In this room apparatus for daily experiments are kept. The laboratory assistant of the teacher can prepare the experiment in the preparation room. In this various apparatus like nails, rings, screws, glass tube, jars, ropes, pipes and various tools are kept.

In the store room biology related apparatus and articles are stored. This room should be kept looked there should be one door opening in the biology room. The articles should be properly arranged in large glass almirahs. The various articles should be labeled. There should be proper light and ventilation. In the science room the teacher demonstrates the practical. The seating arrangement in this room should be such so that all the students can watch the experiment clearly. The seats should be as in theatre i.e ascending order. The windows should have dark curtains, so that the room can be darkened as and when required.

The teachers table should be big enough to place all the apparatus in front of the students. There should be a black-board at the back or towards the left, which the teacher can use whenever required. There should be pictures of biologists on the walls. The dark room is permanently dark but ventilated, this room used to make plants starch less for photosynthesis and photography etc. this room should also have shelf, sink, an eclectic bulb and electricity arrangement.

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