

UNIT-IV:LEARNINGRESOURCES

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UNIT-IV LEARNINGRESOURCES

The role of learning resource in science, it is relevant to understand the process of appropriate learning resources. Let us discuss this issue in detail. It is the responsibility of all the teachers to select resources

- ✓ that will enrich and support the curriculum, taking into consideration the diversity of interests and perspectives and the variety of abilities, learning styles and maturity levels of the learners served;
- ✓ that will stimulate growth in factual knowledge, literary appreciation, aesthetic values, and knowledge of societal standards;
- ✓ that positively and accurately reflect diverse perspectives on controversial issues, ensuring that learners have an opportunity to develop, under guidance, the practice of critical analysis and the ability to make informed choices/ judgments in their daily lives;
- ✓ that represent gender, appearance, sexual orientation,

ability/disability, belief system, family structure, race and ethnicity, and socio-economic status

According to the ROLE Psycho-Pedagogical Integration Model

(The ROLE PPIM) any learner centered teaching learning strategy will involve the following four phases:

- ✓ Information of the learner is defined or revised.
- ✓ The learner finds and selects learning resources.
- ✓ The learner works on selected learning resources.
- ✓ The learner reflects and reacts on strategies, achievements and usefulness

Need and significance of learning resources in Biology

Criteria for Selecting A Resource One should take care of following criterion for selecting a resource of learning

- ✓ Learning Resources should support and be consistent with provincial and local pilot/program curriculum outcomes.
- ✓ Learning Resources should be developed by competent teachers and meet high standards of quality in factual content and presentation.
- ✓ Learning Resources should be appropriate for the subject area and for the age, emotional development, ability level, learning styles, and social development of the learners for whom the materials are selected.
- ✓ Learning Resources should have aesthetic, literary and/or social value
- ✓ Learning Resources should have a physical format and appearance suitable for their intended use.
- ✓ Learning Resources should be one of a variety of media presentation modes.

Therefore, it is important to understand that learning resources should be activity based rather than lecture-based because these are tools of interactive learning and involvement of learners in teaching learning is a prerequisite for ensuring optimum level of learning.

Identifying and analyzing the learning resources in teaching-learning process of Biology

Learning is a complex process that takes multi-faceted dimensions. It is a process that occurs in a socio-emotional context. Teachers and students interacting formally and informally in different situations contribute to learning among students.

Peer group interactions in the school grounds, free time chatting with friends during breaks, why, starting from the morning assembly to gathering together for any festive and significant occasions in the

school, projects carried out in the classroom as well as outside the classroom, anxiously attending the tests and examinations, trips, excursions made with the classmates and teachers- all these are activities are coming under one big canopy that is “Curriculum” where learning will be there as by default. They all together form what is known as a “Learning Community” in which every activity leads to learning.

Learning resources, for the sake of our convenience and study purpose could be classified into three types, namely,

- ✓ Material Resources
- ✓ Community Resources and
- ✓ Human Resources.

In material resources, printed resources, pictures, portraits, diagrams, charts, records, documents, reference books, textbooks, workbooks, encyclopedia, preserved specimen, herbaria, live preservations (potted plants, laboratory equipment, chemicals, preservatives and experiments) are categorized.

In Community Resources, we come across, botanical garden, museums, zoo, hospitals, primary health centers, food processing units, milk dairy, parks, science exhibitions, science fairs, poultry farms, duck farms, mushroom culturing centers, sericulture centers, fisheries, prawn culturing center and farm-houses, department of studies and research in life sciences etc.

In Human Resources, the expertise, subject specialists, scientists, doctors with their respective specializations, experts in animal husbandry, apiculture, ornithologists, oncologists, entomologists, botanists, zoologists, bio technician, senior-most professors in the life science departments are included

Biology Laboratory as a learning resource

A laboratory or lab is a facility that provides controlled conditions in which biological experiment, observation, research may be performed.

Laboratories used for research take many forms because of the different requirements of specialist in the various fields of science. Biological lab can be found in school, college, university and on other place.

The science lab provides opportunities to the pupils to understand the concepts and different ideas of science. The laboratory helps in the development of objective reasoning and thinking, skill of experimentation, observation, problem solving and scientific attitudes among the students.

Location and types of science laboratories

A science lab should be located preferably on the school building if possible. The open space outside the laboratory will be of much use to conduct some of the experiments outside, in sunlight. Biology and general science laboratory should have north-south orientation to provide adequate sunlight exposure. There are three important plans of science laboratory.

Planning of science lab

Before constructing the science lab, the following factors should be taken into consideration at the planning stage. The number of pupils working at a time. The minimum space necessary for each pupil for comfortable working. Limitation of number of science teacher in secondary schools. Need for ancillary accommodation for storage.

Location-It should be preferably on the ground floor

Lay out- It should be 45 and 25 feet for a class of 40 students in demonstration and 20 for practical class. One door should be near demonstration table of the teacher and the other at the other end. Window preferably with wire gauze should be provided and should open outside.



Ventilation- Ventilation should be provided with exhaust fans. Without them conditions might become intolerable for students to work.

Walls- The wall may be 1,1/2 feet thick. Painting or annual white washing should be done.

Floor- They should be cemented. Slight slope helps in sweeping. Round corners prevent the dust from being accumulated.

Water supply and sink- There should be water supply in different places, depending upon the source of water supply. It is preferable if storage tank is built on the roof of science laboratory. Sink must be provided in each worktable in the biology lab where the students would have to clean the apparatus and equipment's, whatever the student is using.

Work table- Single worktable of dimension 1.5*0.75*0.75m is ideal for individual practical classes. The tables must be arranged so that the teacher can easily see from his demonstration table what every student is doing.

Demonstration table- A long table preferably raised by means of a small platform should be provided in each laboratory at one end. The demonstration table must be provided with water supply and gas supply.

Blackboard and bulletin board- A black board must be fitted on the wall just behind the demonstration table, so that the teacher can use it during demonstration. There must be a notice board inside the laboratory near the entrance door.

Cupboard, fire extinguishers and first aid box- There must be enough

number of cupboards or almirahs to store things and chemicals. There must be at least two fire extinguishers and one first aid box in the laboratory.

Store room-In addition to the materials kept in the laboratory, materials which are costly and needing special care can be stored in the store room.

Stock register- The apparatus purchased should be properly checked and entered. A stock register is used for the entry of items received and to maintain a record of science apparatus. It helps in knowing the position of apparatus, specimen and helps while auditing.

Role of science lab in teaching of biological science

The laboratory helps the pupil in the development of manipulative skills. Laboratory exercise trains them in scientific thinking, they develop scientific attitude and scientific methods as a result of laboratory work.

In the laboratory, the teacher comes into closer contact with the individuals and helps them bring out of them their difficulties. The achievements of modern science are mainly due to the application of experimental world. In doing laboratory work, the pupils get a chance for activity both physical and intellectual and they are learning by doing.

For fostering scientific learning in early childhood, active, hands-on learning is very important. And this can best be achieved through science lab experiments.

Science lab experiments promote the development of scientific thinking in students. Rather than making the kids memorize the facts, they are made to think and understand things and the world around them.

Science lab experiments allow students to ask questions, probe for answers, conduct investigations, and collect data. They are engaged in the investigative nature of scientific learning. Children in fact do science in science labs than simply learning science through textbooks

in classrooms.

Science experiments promote discovery and learning. Discovering new ideas is an integral part of learning science. It is something that teachers can't give to students.

Students themselves have to discover new ideas and concepts during their search for knowledge.

In science school lab, children conduct experiments. They adopt alternatives, try to work out things in different areas and understand what works and what didn't really work. Many times, children work on wrong ideas. But it's only when they work on the wrong ideas that they understand the real ideas in a much better manner.

In school science labs, children are viewed as active learners and not just passive recipients of knowledge. Children are given various opportunities to learn and experiment.

Science experiments play a very crucial role in the ongoing intellectual development of children.

In science laboratories, children get time, space, as well as resources to exercise their curiosity. They are given the freedom to engage in new explorations, experimentations, and explanations.

Merits and Limitations of science laboratory

- ✓ It is freely available, cheap and economical.
- ✓ It possesses a great educational value.
- ✓ Preparation of such apparatus helps the students in gaining a deeper knowledge of underlying principles.
- ✓ It develops creative instinct in the learner.
- ✓ It inspires young students to design, explore and invent new apparatus.

Limitations of science laboratory

- ✓ The time and money involved can exceed the limits making it worthless.
- ✓ Improvised apparatus are not durable.

Use of Science and Biology Experiment Kits in Teaching-Learning of Biology

Science is the study of facts. At the same time, science is also about discovering the world around us, of knowing things, and having

new and wonderful ideas. It is against this very definition of science that most educators believe that scientific learning that takes place in classrooms alone is not true learning.

Educational science kits are designed to supplement formal classroom education. These kits contain lab equipment, materials, manuals, and references to be hands-on to provide a holistic learning to students.

There are numerous benefits that educational science kits offer to students. A child is able to learn science experimentally with the help of these kits. Experiential learning or learning by experience is essential for turning knowledge into wisdom for children. It helps a child to absorb more knowledge and ensures that the learning stays in the mind for longer time.

Classroom teaching is not sufficient if you want your children to grasp more knowledge. Educational science kits make learning more effective for students.

Another crucial benefit of using educational science kits is that they make learning a great fun. Classroom learning is believed to be boring because kids get bored listening to long classroom lectures.

Science kits on the other hand make learning fun and enjoyable. Because these kits are hands-on, children are able to have fun while experimenting. For instance, a science weather kit produces thunder sound and lightning which entertains the kids and makes them grasp things in a much better manner.

Educational science kits are indeed the safest way to learn science. There are many theories and principles in science that can be understood only when demonstrated practically.

There are science kits to explain functioning of electronic gadgets like computers, mobile phones, freeze, heaters, washing machines,airconditioners,andsoon.Thesesciencekitsincludesafe

ingredients to ensure maximum safety to children while experimenting with them.

Science educational kits are essential for the child's ultimate learning experience. They make learning fast, easy, and enjoyable.

Science experiment kits are innovative kits that are designed exclusively to mix and blend education and fun. These kits are mainly designed to impart knowledge because they provide detailed and subtle facts on various aspects of life and physical sciences.

They are mainly popular among the students who learn science and are curious to experiment on various scientific facts and data. Auser is able to explore different branches of science includingchemistry, biology, physics, ecology andastronomy usingthese kits.

Science experiment kits help students to learn the practical aspect of science in everyday life. Students generally enjoy doing things practically because theoretical learning sometimes becomes very boring.



Thesekitshelpthestudentstofeelwhatevertheyareperforming and help them to grasp the concerned topic quickly. Really, it is great fun for children who use science experiment kits in their learning process.

The kits are designed in playful and attractive manner so thatthe kids can enjoy using them.They come in various assortments and you can buy one that suits your requirement.

Not only children enjoying scienceexperiment kits, thesekits are even very helpful for the teachers. They are a superb way for

teachers to explain different science concepts to their students. These

kits are a great help for parents who teach their children at home by themselves and want to make the topics interesting.

Science kits make use of real-life investigations that help kids to think about what they have learnt and how to apply it when they go outside to discover, or while they are in the classroom. Overall, educational science kits will teach a child science concepts that they can apply to the world around them, and help them think outside the box.

Teachers and parents find these kits very useful in educating their children because these kits help teach both the in-depth principles of science and the hand-on learning of science.

There are many companies that deal in science experiment kits that are designed to provide knowledge in different scientific fields. You can shop for them online because there are many websites that provide ample information about them.

Some benefits of science kits offer:

- ✓ Save time
- ✓ Avoid false results caused by faulty/wrong ingredients
- ✓ Save money
- ✓ Stimulating ideas for projects
- ✓ Try out multiple experiments
- ✓ Increase your kid's chances of scoring a better grade
- ✓ Bring out the scientist in your kid

4.5 Field visits and excursion as learning resources in Biology

Field trip engages and even entertains students helping to make educational experience more relevant, memorable and meaningful. It offers students the opportunity to learn what is involved in on-ground management, comparison, sharpen their own integrative ability, insight and judgement without actual real life costs of being wrong.

Organization of a field trip for conducting a field trip, we follow

these steps

Trip selection Identify objectives and plan of evaluation for the field trip Select site to be visited and arrange date and time Conduct pre-visit to familiarize yourself with the major features of the field and obtain address, directions, contact person and mobile numbers. Logistic planning

Apply for administrative approval and file requisition for transportation Make arrangement for meals and develop schedule for the day. Arrange special equipment like cameras and collect money for admission fees, if the site demands Inform the parents about the trip. Create a list of students' names and home phone number for emergency.

- ✓ Field trip preparation
- ✓ Discuss the purpose of the trip.
- ✓ Show photographs or poster of the site.
- ✓ Set a standard conduct and discuss money usage, lunch plans, dress code and other necessary things.
- ✓ Discuss how to ask good questions and make a list of open-ended observation questions to gather information.
- ✓ Overview the field trip schedule.
- ✓ The field trip let students to sketch if it is necessary.
- ✓ Ask prepared questions and note the answers.
- ✓ Do things that you have planned.

Postfield trip

Let student to share their observations and reactions to field trip experience. Create classroom bulletin board displaying materials collected while on field trip.

Evaluating the field trip

Write a report regarding the field trip. This will provide a good reference for future field trips. Share the evaluation with the students, hosts from the field trip site and school administrator.

Role of the field trip in teaching of biological science

- ✓ **Motivate student through increased interest and curiosity-** It can add variety to the regular classroom instructional program and tend to be a special and enjoyable learning experience.
- ✓ **Increase student-student and student - Teacher social interaction** field trip provides an opportunity to involve students and teachers in the programs. The interaction among students will increase when they work in groups. The interaction between the students and teachers will enhance, as the students will have to discuss with the teachers when they have doubt.
- ✓ **Develop social awareness-** Field trips make students aware of learning activities in everyday life. A well-organized trip to a “normal” place is an excellent method of teaching students to observe, ask question and learn in a large classroom.
- ✓ **Experiential learning-** Involvement in a real-world experience makes learning more meaningful and memorable. As a result, the students will have more concepts of the topics they have learned through their hands-on experiences.
- ✓ **Concrete skills such as note taking-** The students have to develop questions to be asked, write reports etc. after the trip or evaluate their experiences.
- ✓ **6-Real world experience-** Field trip helps the learners to experience real world. They help the students appreciate the relevance and importance of what they learn in the classroom.

Merits of field trip

- ✓ **Real world experience-** it allows students to have a real-world experience.
- ✓ **Increase in quality of education-** for example, biology trip could take students to a zoo. In this case, students can learn more. Hence, it improves the quality of education.

- ✓ **Improvement of the social relations-** it is a way to bring the students close together. In fact, it is often a good idea to go on a field trip to help to create a bond between the students.

Limitations of field trip

- ✓ **Time consideration-** Difficultly in preparation and fitting the trip as per the school time-table, which takes more time.
- ✓ **Lack of support from school administrations for field trip-** It means school cannot afford the material and sometimes can't provide financial assistance due to which students have to search their own ways.
- ✓ **Poor student behaviour and attitude-** Sometimes some students do not listen to the teacher showing their ego, attitude and doing the things on their own ways which cause trip to be unsuccessful. It affects the other students and the relation between teacher and students because of bad attitude.
- ✓ **Shortage of resources and choice of venue-** Means sometimes school do not provide the material and teacher also do not have the correct material for the trip. And sometimes students do not have the choice to pick their own place and they have to agree with the teacher's choice which shows students do not have the choice to select the venue.
- ✓ **5. Medical risk-** For example, while travelling, some children get motion sickness.

ICT based virtual experiments and simulations resource in Biology

Now days, it is being observed that there is a paradigm shift in the teaching learning process and therefore in the support system that we use for effective teaching and learning. Information and communication technology is going through rapid and continuous change and therefore use of ICT is highly common in the teaching

learning process. These changes are reflected by the change in the learning strategy of learners. Different researches proved that new generation of children are using these resources extensively and they share, use, develop and process information and technology for different purposes.

It is essential that the contemporary teacher has good ICT skills and is able to integrate ICT into the teaching and learning processes. It is highly recommended that after a good teacher education Programme, the newly appointed teacher demonstrates current knowledge and proficiency in the use of ICT in the following areas:

- Basic operational skills
- Information-technology skills
- Effective use of the internet
- Software-evaluation skills
- Pedagogical skills for classroom management.

Different ICT resources include

- ✓ **ICT based learning objects**- It refers to any digital resource that can be reused to support learning.
- ✓ **Multimedia Learning Resources**- Computer-based multimedia learning environments - consisting of images, text and sound offer a potentially powerful setting for improving learner understanding.
- ✓ **Mobile Learning**- The terms “M-Learning” and “Mobile Learning” are usually used to refer to teaching and learning with mobile technologies. It has following characteristics:
 - Spontaneous
 - Personal
 - Informal
 - Contextual
 - Portable
 - Ubiquitous (available everywhere)

- ✓ Pervasive (so integrated with daily activities that it is hardly noticed)
- ✓ **The Internet and Social Networking** – Internet is a rich resource for teaching and learning. Web 2.0 refers to a more recent 2nd generation collection of web-based tools, usually involving social networking (sites like Facebook) and amateur publishing (like blogs and YouTube).
- ✓ **Interactive whiteboards, slide/PowerPoint presentations** – In most of the schools, interactive whiteboards is used to deliver multimedia presentations in a classroom environment. Presentation software, such as Microsoft PowerPoint or Apple's Keynote, plays an important role in many fields, especially in learning.

Roleoftheteacher

Teaching the science of life and living organisms, biology teachers provide introductory to advanced training for future professionals such as doctors and medical professionals. Not everyone is suited to teach this challenging educational field. There are several qualities that you need to become a biology teacher.

SubjectMatter

Biology teachers should have a good knowledge of subject matter of biology. Every biology teacher is required to have at least a bachelor's degree in biology and one professional degree.

ResearchSkills

Research skills are an important quality of a biology teacher. The teacher should be able not only to determine the data through laboratory field study; he/she should be able to explain what the data means to the students.

PedagogyandProfessionalism

Pedagogy, or teaching skills, is very important in teaching biology. During lab activities such as dissection of fetal pig or frog, some students may feel nausea in the lab settings but it's the quality of biology teacher even in that condition they must be able to understand the topic.

The biology teacher also has to maintain professionalism. Sometimes the teacher has to teach controversial subject matter such as human sexual biology and evolution, the teacher should also practice restraint in separating fact from theory in controversial subjects, allowing for educationally appropriate examination from multiple perspectives.

Sincerity of purpose

A teacher should have love for his profession. He should be seriously and sincerely committed to his duties and work. As such he must be on the path of excellence both for his own personal achievements and that of his pupils.

Studious and learned

A very desirable quality of a teacher is his taste for reading. He should have the habit of keeping himself in touch with the latest development especially belonging to biology sciences subject. He should be a voracious reader of the knowledge available to him from multi-dimensional sources.

A good communicator of ideas

A teacher should be clear in speech and should be able to convey his ideas to his pupils with ease and effectiveness. His black board and sketching should be quite neat, bold and effective.

Plain speaking: A teacher by nature should be truth loving and plain speaking. He must have enough courage to say the right thing as right and wrong ones as wrong. There should not be any ambiguity in his thoughts and saying.

Impartial behavior and attitude: A teacher should not have any biases and prejudices of any kind towards any of his students. He should not distinguish and discriminate one person from the other and should try to drop all notions of antagonism by giving a solid proof of his impartial behavior and attitude towards all of his students

Hard worker and responsible: The teacher should be his own example of hard work and sincerity. He should inspire his students to acquire a taste for learning, doing safe work as well as sharing responsibilities with all his keenness and sincerity.

Affectionate behavior: The teacher should create an atmosphere of good will, love and cooperation in the matter of dealing with his students. He should not get irritated on minor faults and mistakes of his pupils but should try to create an environment of mutual trust and affection congenial for proper work and learning.

Patience: A teacher should not lose his patience and unnecessarily get disturbed over minor mistakes and shortcomings of his pupils but must demonstrate a lot of patience in dealing with them. On the other hand, the pupils should not always live in constant fear of the teacher but must try to receive proper guidance from their teacher

Leadership and love for discipline: The teacher must possess the traits of a good leader in whom the students may have a genuine faith. He should be able to inspire the students to seek knowledge with sincerity. A disciplined and sincere teacher will be able to inculcate the values of sincerity, discipline and obedience among students. This will channelize the energy of students towards constructive activities.

Self-confidence: A biological science teacher must have confidence in his abilities. This confidence must be demonstrated through his behavior in general and his classroom teaching in particular.

Mastery of his subject: A biological science teacher should have profound knowledge of his subject of study so that he may not cut a sorry figure before his students. He should be able to keep his head

high and be able to answer all the questions and problems put to him by his students up to their satisfaction in all branches of his subject.

Knowledge of other subjects: A biological science teacher should not only be an expert in his subject but should also have a good working knowledge of the other related subjects. For example, the physics teacher should have good knowledge of Mathematics and Biology teacher should know much about chemistry in order to do more justice with his teaching.

Scientific thinking and attitude: A good science teacher should imbibe scientific thinking and attitude in his own actions and thoughts. To imbibe such traits, a science teacher must attempt to provide science education in such a way as to inculcate in the pupils a habit of testing the validity of certain beliefs and facts by their own independent observations and experimentation.

Efficiency in the preparation and use of teaching aids: The science teacher should have sufficient skill and dexterity in improvising and constructing his own aids in teaching of science according to the local needs and situations. Needless to say, that he should have full self-confidence in handling all types of demonstration equipment and materials as well as in using all types of audio-visual aids for making the science teaching as effective as possible.

Taste of scientific activities: A good science teacher should have taste and love for organizing and participating in scientific activities like establishment of science museum and science club, organizing scientific excursions and science fairs and engaging in the purposeful scientific hobbies. Such activities constitute real education and help in the proper development of scientific attitude among the students.

Knowledge of psychology related to science: The teacher should have knowledge of the science of behavior of his students in order to handle them effectively in the teaching-learning process. He

should try to impart knowledge and skills to them according to their mental abilities, capacities, interests and attitudes, as well as emotional and social make up.

In-Service Training: Training provided after entering the profession for updating knowledge and skills related to teaching methods, child psychology, source of knowledge etc., on accordance of changes occurred in all these departments.

Self-Development: Teachers can update themselves by indulging in dynamic reading, browsing online, consulting experts in different fields, making trips, conducting interviews with parents and teenagers, observing the routines of their own children etc.

Limitations hurdles in the use as learning of various learning resources in Biology.

Hurdles in the use as learning of various learning resources in Biology include

- ✓ Lack of affordable textbooks,
- ✓ Computers and broadband connectivity,
- ✓ Lack of clear policy
- ✓ lack of financial resources can result in
- ✓ Lower academic performance
- ✓ Less attraction to certain education subjects
- ✓ Teachers lack of knowledge regarding how to teach to standard
- ✓ The learning materials are often lacking or of poor quality
- ✓ There is insufficient and inadequate management of time
- ✓ There is inappropriate assessment of student learning.