METHODS OF TEACHING BIOLOGICAL SCIENCE

LECTURE METHOD

This is a method which is generally followed in colleges and in higher standards in schools. In this method only the teacher talks; the students are passive listeners and they do not take any active part. Pupils listen, get bored, yawn and sometimes go to micro- sleep as well. The teacher acts like a chatterbox, talking and talking all the time without ascertaining whether the students are following him or not) The students are spoon-fed and their powers of observation and reasoning, the exercise of which is so essential in the learning process are not stimulated.

Perhaps this method originated in very ancient times, when printing press was not invented and hand-written manuscripts were very few, hardly for the use of teacher. Dr. Johnson stated Lectures were once useful; but now when all can read and books are so numerous to attend certain lecturers, however he attended some lecturers for their extreme clearness and the admirable illustrations. This is purely a teacher centered method and in its extreme form, does not expect any questions or response from the students. students. However this method has its own merits.)

Merits:

- ***Attractive and concise:*** It is very attractive, concise and very easy to follow without much botheration on the part of the teacher and the taught. The teacher feels secure and satisfied.
- ***Economical :*** It is economical because no laboratory is needed and one teacher can teach a large number of students at a time.
- ***Speedy :*** Lengthy syllabi can be covered in a short time by this method.
- ***Useful for Logical Sequence:*** The logical sequence of the subject can be easily maintained. Since the teacher has to plan the lectures in advance, there cannot be gaps or over-lapping in the development of the lesson.

- ***Time Saving:*** In this method there is no student activity, no project no demonstration, therefore there is hardly any wastage of time and lesson can go at top speed.
- ***Inspirational Value:*** Good lectures have high inspirational value. Sometimes students pick up motivation, inspiration, instigation, zeal, ambitious ideas and do something creative in life.

Limitations

- ***Memory based:*** rt lays too much stress on memory work Experimental work is neglected and the power of observation of a child is seldom exercised.
- ***Spoon feeding :*** It does not encourage independent thinking, discovering, exploring and taking initiative. It is a type of spoon feeding and all the faculties of the child are not allowed to develop.
- ***Teacher centered:*** When the teacher lectures, there is no guarantee whether the pupils are concentrating and understanding all what the teacher is teaching.
- ***Too Rapid:' The*** rate of imparting knowledge and information may be too rapid and the students may not get necessary connections of thought.
- ***Unpsychological :*** In this method the teacher is active participant while the students are passive listeners, which is opposed to the principles of psychology. The interests, aptitudes and capabilities of the pupils are ignored.
- ***No inculcation of Scientific attitude:*** It does not help to inculcate scientific attitudes and training in s c ie n tili method among the pupils.
- ***No learning by Doing:*** There is no place for learning by doing in this method. The very root of science is cut when practically nothing is done, for science is something which must work.
- ***Authoritarian :*** This method is undemocratic, the pupils are encouraged to depend upon one authority i.e., the teacher. They cannot challenge or question his verdict.
- ***No critical Thinking :*** It fails to develop critical thinking and reasoning power, so essential

for democratic living.

An informal talk punctuated by suitable questions and made spicy by the use of audio visual aids providing a more vivid picture, will be able to secure sustained attention of the pupils and will result in considerable amount of learning.

- ***Useful for Higher Classes:*** This method may not be very helpful for teaching lower classes. However, it can prove very successful for higher classes i.e. tenth, eleventh, and twelfth classes when we want to ;-

✓ Cover the syllabus quickly.

✓ introduce some new and difficult topics, such as evolution of man, discovery of natural magnet etc.

✓ arrive at generalizations from the facts, gathered by students.

✓ impart factual knowledge.

✓ explain certain difficult and theoretical points which cannot be demonstrated such as manufacture of sulphuric acid

✓ explain practical demonstration which is to be done or which has been done.

✓ r e v i se and summarize the lessons already learnt.

✓ give some background material for a topic

✓ give biographical sketch of a scientist or relate some of his anecdotes

- Any lecture has to be planned well in advance . Selecting the content, objectives of teaching the content, structuring the lecture, summarising at every step and also at the end must all be planned.
- ***Notes-taking:*** while making use of this method, it will be beneficial if the teachers give some training in the art of notes taking while the lecture is on.
- ***Student's Question:*** At the end of the lecture, time should be given for the students to ask questions and such questions be answered by the teacher without any hesitation. In this way

the teacher can make sure whether the students have understood the lesson or not.

DEMONSTRATION / LECTURE DEMONSTRATION METHOD

The main drawback with the lecture method is that it is one-way process. The demonstration method takes note of this fact and thus while in a lecture method the teacher merely talks, in a demonstration method he really teaches. The teacher performs experiments before the class and meanwhile goes on asking relevant questions from the class. The students are compelled to observe carefully because they have to describe each and every step of the experiment accurately and draw inferences. The students are questioned and cross-questioned concerning the problem in hand and their inferences discussed in I the class. Thus, unlike in a lecture, they are active participants in a demonstration and their faculties of observation and reasoning are properly exercised. Since this method combines the merits of lecture method with that of demonstration method, it is also named as Lecture Demonstration method.

Principle

This method is based on the principle: *Truth is that which works.* The teacher has to work out something and then only the students will believe.

Requisites for a Good Demonstration

The method, though very popular and most widely used, may not prove successful with some teachers. The following are some of the requirements which will assure that the demonstration will be a success.

Appropriate Arrangements: While performing an experiment the teacher must be sure that everything done on the demonstration table is clearly visible to the pupils. There will be no difficulty if a lecture gallery is available but in its absence there are several ways of enabling the pupils to get a better view.

When there is no demonstration table: The teacher may carry on the experiments on one. of

the student's table located in the front row and the class can view the demonstration by standing at some distance round the table. This method may prove very useful with small classes. ***Sufficient Light:*** Attention must be paid to adequate lighting of the demonstration table and the back-ground. Additional illumination may be used if necessary. Proper back-ground is very important. Black things should never be shown in front of the black-board.

Demonstration Apparatus: Demonstration apparatus should be a l arge as possible such as a big model of electric bell, v e rni er calipers etc. and the graduations on any instrument should be clearly visible.

Arrangement of Apparatus: Everything must be placed in order before the demonstration starts. The apparatus to be 80 used should be placed on the left hand side of the table and arranged in order in which it will be shown. After a particular thing or apparatus has been used, it should be transferred to the right hand side. When several things are to be shown, they should not be placed all at once. A wealth of apparatus may impress a student but it can confuse him as well. The general order and tidiness of the demonstration table is very essential. Nothing looks worse than a demonstration table littered with books and other useless things. Only the things relevant to the lesson should be placed on the demonstration table.

Preparation by Teacher : The teacher must be sure that the experiments will succeed and are strictly clear. This demands adequate preparation on the part of the teacher and rehearsal of the experiments under the conditions prevailing in the class-room.

Securing attention: Attention of the class is very important. The teacher should know various methods of arresting and creating interest. He may, at occasions, be a bit of a ‘showman’. To inspire the class with a sense of dramatization and to arouse an atmosphere of suspense just before the critical point of an experiment, is an art. It is useful to a teacher as to an actor.

Effect of Season: Proper account should be taken of time and season. Climate conditions sometimes affect the apparatus. For instance, frictional electricity experiments should not be done during rainy season. Hot season is best for experiments with ice. White phosphorus can be safely used on a cool day.

Teaching Aids: Demonstration experiments should be supplemented with teaching aids like charts, pictures, diagrams, models, film strips etc.

Use of Black board: A large black -board behind the teacher's demonstration table is most essential. During the lesson the teacher can use it to great advantage. Tabular statements for entering data, principles arrived at, as a result of demonstration, can be written on the black-board. Necessary simple diagrams can be drawn on it.

Conduct of a Demonstration Lesson

A vast majority of the science teachers follow demonstration method. It, therefore, seems appropriate to discuss some of the essential steps to be followed in a demonstration lesson.

- ***Planning and Preparation***

Demonstration method is, in fact, an acid test of the teacher's ability and therefore he must be thoroughly prepared for it. While preparing he must bear in mind the following points:

- subject matter knowledge
- lesson notes including the type of questions to be asked. rehearsal of experiments;
- collection and arrangement of apparatus required.

The teacher may be fully conversant with the topic concerned; even then it is a wise policy to go through the relevant pages of the text-books of the students. This will enable him to be exact and to the point required. Drawing up a lesson-plan is equally necessary and this should include a list of the principles to be explained, a list of the experiments to be demonstrated and the type of questions to be put to the students, in an order to be followed, in the class. This will make his work very systematic. Nothing discourages a student more than a badly

arranged demonstration where nothing works. Each and every experiment, therefore, should be rehearsed under the same conditions that prevail at the time of demonstration. Rehearsal of experiments w i ll enable the teacher to collect all the requisites for the demonstration. In short a teacher should prepare himself for the lesson as thoroughly as a girl prepares herself for her wedding.

- ***Introducing the Lesson:***

It is useless to start a lesson without properly motivating and preparing the minds of the students for it. The lesson should be introduced in problematic manner so that the students can appreciate and realize the importance of the topic in hand. for, when a teacher is able to awaken the keenness and enthusiasm or prove the law. On the other hand a better teacher will consider his lesson incomplete unless he has discussed with his pupils the many and varied illustrations and applications of the principle, met within different phases of life, such as ships, floating bodies, diving and rising of submarines, the use of balloons and air-ships.

(ii) *Use of Illustrations:* If the lesson deals with a particular branch of science, a widely-read and well informed teacher will draw illustrations from all branches of science. In addition to this, wherever practicable, reference should be made to the names of great his pupils, half the game is won. The teacher should begin the lesson with some personal experience or incident, a simple and interesting experiment, a familiar anecdote or by telling a story. He should keep in mind the value of an interesting experiment the experiment which will set his pupils talking in school and out of it, about the wonderful things they have seen or done in the science lesson. Speak of the start, it should be the constant enthusiasm of the teacher to maintain interest and enthusiasm of the pupils alive throughout the lesson. He should, on every suitable occasion, introduce an experiment which will arrest their attention by its striking results.

Examples

- *Air Pressure :* The anecdote of Guerike's experiment with hemispheres of 18 inches radius being pulled by a team of sixteen horses can be related to create interest in the lesson.
- *Carbon dioxide :* To start the topic on carbon dioxide the teacher may open a soda water bottle in the class and ask about the visible gas coming out of that.
- ***Presentation of the Subject-matter:***
- *Broader sense of Teaching:* Lesson should not consist of dry bones of an academic course but a breadth of treatment is essential. Teaching, in fact, should be kept on as broad basis as possible. The actual lesson may be concerning some prescribed topic but the teacher is at liberty to treat it in narrow sense or to introduce into his teaching material, illustrations from a wide field of knowledge and experience.
- For example, in a lesson on the principle of Archimedes, the narrow academician will feel content when he ha demonstrated two or three experiments, the results of which scientists and their works. The lives and achievements of great men are always sources of inspiration and an acquaintance with their early difficulties encourages the young pupils.
- *Judicious Questions:* During demonstration judicious questions should be so arranged that their answers form a complete teaching unit.

➢ ***Performance of Experiments***

The work at the demonstration table should be a model for the students to copy. An untidy demonstration will lead to bad work in the practical class. The mam points about experimentation are summarized below:

- *Clear Results :* The experiments must work and their results should be clear and striking. The teacher should never try to make an experiment succeed by illicit means. ff every t i me the teacher has to say, 'well, this is what should have happened,' the confidence of the pupils is lessened.

- *Simple Experiments:* Experiments should be simple Long drawn out experiments with complicated apparatus defeat the purpose of demonstration. Lengthy experiments like composition of air by rusting of iron, presence of carbon di oxide in air etc should be avoided. *Appropriate T*ime *of Experiments :* Experiments should be well-spaced throughout the lesson. It is wrong demonstrating all the experiments at an early part of the lesson or rushed in at the end.
- *Convincing Experiments :* A large number of experiments do not always make the topic very clear. In fact one big, convincing and striking experiments is of more value than half a dozen experiments, not closely related to the topic.
- *Reserve Apparatus :* Reserve apparatus should always be kept near the demonstration table so that much time is not wasted in collecting the apparatus in case of breakages.
- *Arrangement of Apparatus :* Apparatus should be arranged in an order in which the experiments are to be shown.
- *Time Saving :* It is a wise policy to store the demonstration apparatus intact until it is to be used again. It results in much economy of time for the busy science teacher.
- ***Black-board Work***
- Chalk board is a very useful aid in a demonstration lesson. It is mainly used for two purposes:
- for tabulating data, important results and principles in summarized form.
- for drawing necessary sketches and diagrams.

➢ ***Copying and supervision***

The demonstration lesson will remain incomplete if the tudents do not copy the data in tabulated statements, blackboard mmary and the sketches drawn on the black-board. A record of e black-board summary will prove very useful for further ferences. The teacher

should frequently go to the seats of the tudents and see if they are copying properly.

- **Common Errors in a Demonstration Lesson**

- Some of the most common errors committed by the inners in giving demonstration lesson are summarized below:
- The apparatus may not be ready for use.
- The teacher may fail to show how the demonstration fits into the problem in hand.
- The teacher may not be able to focus the attention of the students to the important facts of the experiment.
- Black-board may not be used properly.
- The minor facts may be given as much importance as the major facts.
- The teacher may arrive at the generalization himself rather than getting it done by the pupils.
- The teacher may fail to emphasize the generalization.
- The language used by the teacher may be difficult for the students to understand.
- Right type of questions may not have been asked.
- The persistent and continuous talking by the teacher may have marred the enthusiasm of the children.
- Sufficient time for recording data may not have been given to the pupils.
- The students' interest for further study may have been over

- ***Useful in dangerous Experiments :*** It is helpful in case of dangerous experiments like· preparation of chlorine, burning of hydrogen etc.
- ***Economical :*** The method is considered most economical. When apparatus is not sufficient for the students to do practical individually, the teacher may perform the experiment before the whole class. Also it saves time when a number of experiments can be performed in a short time.
- ***Time Saving :*** It is a time-saving method. If compared to Heuristic, Project or Experimental

methods, it saves much time. On this score it cannot be compared to lecture method which is too fast.

- ***Based on Activities :*** Although it is not a child-centered method, yet the students are kept engaged in various activities like observing, taking notes, answering questions, drawing diagrams and sometimes involving in the actual performance of experiments.
- ***Useful for everyone :*** It is suitable method for all types of students i.e. average, below-average and above-average looked.

Merits:

Psychological Method : This methods is psychological because the students need not imagine anything, instead they are shown concrete things and living specimens. Consequently they take active interest in teaching-learning process. It, therefore, motivates their interest and enthusiasm for science.

Sensitive Apparatus : Demonstration is very suitable technique when the apparatus is very costly or very sensitive and is likely to be damaged if handled by the students e .g. Fortin's barometer, electric dynamo etc.

LIMITATIONS:

Not Based on learning by Doing : There is no scope for learnmg by doing' which is an important principle of learning and the students do not relise the joys of direct personal expenence.

Not Child Centered : It is not child centered The teacher has the final responsibility to manipulate and perform the experiments in any manner he likes. Therefore, to some extent it has an authoritarian, approach. and is teacher dominated.

No Scope for Individual differences : This method does not provide food for individual differences. Slow learners and genius are made to crawl at the same pace.

Obstacle in Progress : The desirable laboratory skills are not developed among the students.

Not Based on Scientific Attitude : It does not inculcate the most-needed scientific attitude and training in scientific method.

Laboratory Method

For a long time and even today teaching facts of science is considered as the only objective. Nevertheless· facts are important and basic to learning of science. But facts are only means and not end in themselves. Science offers much scope for developing skills of inquiry and problem solving in young pupils. Much reading and discussion in science work are essential but it is in the laboratory, hypotheses are formulated, tested and conclusions arrived at.

Boek (1951) compared inductive-deductive approach to deductive-descriptive approach. The former approach utilized data related to the problem. Teaching progressed from the particular to the general. Students were encouraged to recognize the value of controlled experiments, basic assumption for a laboratory plan, need for using good laboratory techniques and careful observation, desirability of clear and easy-to-use records. and the limitations of the data collected for drawing conclusions. Students played an important role. The deductive-descriptive approach was based on the laboratory exercises from a type equilibration. There is no substitute for laboratory work because it provides for learning by doing. This can be used to force students to become creative by designing and performing their own experiments to test hypotheses. It is also needed for inspirational science teaching. It ensures science teaching. It ensures meaningful learning and mastery of principles and applications. Students get an environment to carry out scientific activity and exercise their ingenuity. They also learn to work in co-operation with other learners.

Experiments bring reality into science classrooms and promote the development of powers of observation, measurement, prediction, interpretation, designing and decision making Laboratory work usually involves the carrying out experiments by individuals or small groups. They help the learner or a small group of learners to find a qualitative or quantitative answer to a problem. The old argument of laboratory versus demonstration is no

longer sensible. They do not replace each other E*f*fective science teaching requires the use of both of them.

• Students should know the purpose for performing an experiment.

• Successful experimenting requires careful planning.

• Students while performing experiments may work as individuals or groups.

• Experiments should be performed carefully and exactly.

• In primary and junior high schools simple apparatus should be used.

• Students can be asked to suggest experiments to answer their own questions.

• Experiments should be done in such a way as to make them think.

• Laboratory work should be motivated by the spirit of discovery.

• Students should be provided with the opportunities to plan method, make mistakes and try various methods until they gather adequate evidence to draw conclusions.

• Students should exercise great caution in drawing conclusions from experiments.

• Johnson (1957) has listed five ideas as trends in studies $_{011}$ concept formation:

i. Learning that is meaningful is more effective than learning that lacks significance.

ii. Learning takes place somewhat in proportion to the involvement of the learner in learning activities.

iii. The role of the teacher as a guide or participant in pupil teacher planning stimulates learning.

iv. Manipulation and sensory learning continue to demonstrate superiority over verbal learning.

v. The goal acceptance by the learner appears to be involved in the learning situation.

Much of our laboratory work is open to serious criticism. Usually it consists of little more than a learner going through a set of procedures following directions of a 'cooking recipe book'. A good laboratory programme basis of ii, iii, and iv stated above should be prepared

on the principles.

A good laboratory work has the following characteristics:

Teachers should check the experiments to be performed by the student. A briefing can take the following form: The experiment today involves difficult measurements. Even small errors in your measurement will invalidate the experiment. Concentrate on accuracy and calculations.

❖ Laboratory work should emphasize the investigative approach rather than the illustrative exercise (Mallinson, 1958).

❖ Rainey (1965) reported that when fewer directions are given in a high school chemistry laboratory in terms of the performance of the experiments, students do better laboratory work.

❖ Open-ended laboratory experiments with minimum directions on how to perform the experiment may be arranged wherever possible. •

•• According to Carpenter (1956) manipulation or study of objects contributes more efficiently to an understanding of scientific ideas than a teacher's lecture. Manipulation of apparatus helps students to learn basic skills.

Organizing Practical work:

There are two ways of organizing practical work. One method is called 'even-system' where students in a class are all doing the same experiment either individually or in convenient groups. In this case the theoretical ideas can be taught by the teacher and students can follow it up in practical work acquiring the process skills. Supervision by the teacher in this case is also easy for the teacher. The only limitation in this method is that multiplicity of apparatus of the same kind should be available in the laboratory.

When there are limited number of apparatus available for certain areas, the other way

to organize practical work is by group rotation' method. Students would be formed into convenient groups and the different groups would be doing different experiments prescribed in the syllabus. In the succeeding practical classes students would go in rotation to do other experiments, In this case, although the cost of maintaining different sets of same apparatus is less, there are many disadvantages, Theory and practical cannot go together. Effective supervision by the teacher is also not possible. This arrangement can be successful only when students are given an instruction card or a laboratory manual which gives detailed procedure for doing the practical work.

Instruction Cards:

A card of size about 6" X 4" is used and instructions as to how to proceed with the experiment are given by the teacher and placed beside each apparatus. The card should contain the following information.

- Aim of the experiment
- Procedure for doing the experiment
- Precautions if any to be observed.
- Method of tabulating the data and the result to be obtained.
- Any Question that may help in reaching the desired conclusion.

Laboratory Manuals:

Laboratory guides are available in the market for all courses of science studies from the school level to higher education. It is the normal practice for the students to strictly follow the laboratory guides which give complete and detailed instructions regarding the procedure to be followed for the experiment, the data to be collected and tabulated and the final results to be expected. They do not omit even simple details relating to the experiment and seldom give scope for the students either to act on their own or to exhibit their initiative and ingenuity. These traditional laboratory guides resemble cook hooks in their content. They cut the very root of the spirit of inquiry which should normally be promoted in any worthwhile programme of science.

Laboratory Records:

Students are normally expected to maintain a record book, technically called observation record' for noting down their observations made in the course of the practical work in the laboratory. A detailed report is prepared in the 'fair record' leisurely at home, transferring all the data collected in the Observation record to the fair record which is only assessed and given credit.

In practice, a mere look at the observation record maintained by the students will only reveal that it is only a rough note book. More often the data presented in the fair record would have no relevance to the data collected and recorded in the observation record during the experiment, as some kind of post analysis is done at home and the result manipulated.

Hence if teachers want to encourage the students to adopt scientific approach to experimental work, to be keen observers, to be neat and accurate in their work, they have to assess the students' laboratory notebooks, instead of the fair records prepared at home. If such 'Instant laboratory-reports' are required to be handed over at the end of practical work, students would not only work faster but would try to make sense of what they are doing. If

calculations are done immediately, obvious errors can be picked up. There may even be the opportunity to do the work again and get it right.

Major points to be kept in view while conducting practical work

Practical work serves as back bone for teaching all types, of topics in the subject of science. Therefore for proper success 'm this field a well-organized and systematic procedure will have to be adopted. However some suggestions for conducting the laboratory work in a proper way are given below:

❖ ***Practical and theory side by side***

Practical and theoretical work should go side by side. If laws or reflection and refraction are being taught in "light" they must be clone in the laboratory along with theory.

❖ ***Individual working***

If possible, separate apparatus should be supplied to every student, and individual working should be given preference *Twenty students at a time.* Not more than twenty students should be allowed to work at a time in the laboratory, otherwise the teacher would not be in a position to have proper supervision and check in their work.

❖ ***Instructions***

Detailed instructions must be given before starting the experiment.

❖ ***Clarity of aim and purpose***

The aim and purpose of the experiment should be made quite clear to the students, what they want to find, and how they can achieve it.

❖ ***Accuracy of results***

For obtaining accurate results, superior type of apparatus should be supplied, but too much stress should not be laid only on obtaining accurate results.

❖ ***Records***

A complete, neat, legible and faithful record should be made for all types of observations and inference collected. Making a rough record or the loose sheets should always be discouraged.

❖ ***Work in the laboratory***

All the experiments, along with diagrams and results must be complete in the laboratory. Note books must be checked, and signed by the teacher before the students leave the laboratory.

❖***Critical examination***

The teacher should pay attention to critical examination of the records taken by the students and methods adopted by them.

❖ ***Habit***

A habit of proper handling of apparatus and economical use of chemicals must be developed among the students.

❖ ***Systematic arrangement of apparatus***

The apparatus should be arranged systematically so that it can be quickly delivered to the students.

❖ ***Overcoming insufficiency of apparatus***

In case of shortage of apparatus students should not be discouraged or denied from doing practical work for themselves. Some other means must be found out for overcoming the difficulty occurred.

❖ **Procedure Followed While Conducting Practical Class** The procedure adopted for conducting a certain practical mainly depends upon the apparatus to be supplied, nature of the practical and the number of students present in the practical *c* lass There should not be more than twenty students for a teacher to supervise. Some of the methods and techniques for conducting a practical in the class are given below.

• A day before the commencement of the practical, students should be asked to come well prepared along with their practical note-books.

• If sufficient time is not available for giving instructions in details, they should be asked to take help from instruction cards or laboratory manuals supplied to them.

• If time allows, they should be given detailed instructions on the black board and v~rious points should be well explained.

• Various precautions to be observed should also be explained.

• In order to arouse the interest of the students, application of the practical in our daily life should also be mentioned.

• Teacher should pay proper attention to examination of the record taken by the students and should guide them accordingly.

• The purpose of the experiment must be made very clear to students and the students should be asked to keep faithful record of what they do and observe.

Project Method

This method was advocated by Dewey - the American philosopher, psychologist and pragmatist. The project method is a direct outcome of his philosophy. According to Stevenson "A Dr. Kilpatrick A project is a unit of whole hearted purposeful activity carried on preferably in its natural setting. According to Stevenson “A project is a problematic act carried to its completion in its natural setting. According to Ballard, “A project is a bit of real life that has been incorporated into the school.

The project method is not totally new. Project equivalents were advanced for the adolescent period by Rousseau in ‘Emile’. ‘A project plan is a modified form of an old method called ‘Concentration of studies’. The main features of concentration of studies plan is that some subjects are studied in relation to it.

Project method is based on the following principles:

- Learning by doing.
- Learning by living.
- Children learn better through association, cooperation and activity.

What is an Educational Project?

- Various definitions of project have already been considered. A modified definition of project is given by Thomas and Long. They define it as "a voluntary undertaking which involves construction effort eventuated into objective results".
- Considering various definitions of project we may consider it as a kind of life experience which is an outcome of a craving or desire of the pupils. This is a method of spontaneous and incidental teaching. "Learning by living" may be a better meaning of project method because life is full of projects and individuals carry out these projects in their everyday life.

The projects may broadly be classified as:

- (i) Individual projects and

- (ii) Social projects.
- Individual projects are to be carried out by individuals where as social projects are carried out by a group of individuals.

Steps in a Project

For completing a project we have five stages in actual practice. These are

i) Providing a situation

ii) Choosing and proposing

iii) Planning of the project

iv) Executing the project

v) Judging the project

Recording the project is also essential.

Providing a Situation

- A project should arise out of a need felt by pupils and it should never be forced on them. It should be purposeful and significant. It should look important and must be interesting.

For this the teacher should always be on the look out to find situation that may arise and discuss them with students to discover their interest. Situations may be provided by different methods. Some such method may include talking to students on the topics of common interest e.g., how did they spend their holidays what did they see in Chennai etc.

- **Choosing and proposing**

From various definitions of an educational project we get the same underlying ideas:

• School tasks are to be as real and as purposeful as the tasks of wider life beyond the school walls. manipulative skills to prevent waste of materials and to guard accidents. The teacher should assign work to different students in accordance with their interests, aptitudes and capabilities. Teacher should see that every member of the group gets a chance in do

something. Teacher should constantly checkup the relation between the chalked out plans and the developing project and as far as possible spot changes and modification be avoided. However if such changes become unavoidable these should be noted and reasons explained for future guidance.

❖ **Evaluation**

The evaluation of the project should be done both by the pupils and the teachers. The pupils should estimate the qualities. They are of such a nature that the pupil is genuinely eager to carry them out in order to achieve a desirable and clearly realized aim. According to Kilpatrick, "the part of the pupil and the part of what they have done before the teacher gives his evaluation. The evaluation of the project has to be done in the light of plans difficulties in the execution and achieved results Let the students have self-criticism and look through their own failings and the teacher in most of the school work, depends largely on who does the proposing". The teacher should refrain from proposing any project otherwise the whole purpose of the method would be defeated. Teacher should only tempt the students for a particular project by providing a situation but the proposal for the project should finally come from students. The teacher must exercise guidance in selection of the project and if the students make an unwise choice, the teacher should tactfully guide them for a better project.

❖ **Planning**

The students should be encouraged by the teacher to plan out the details of the project. In the process of planning teacher has to act only as a guide and should give suggestions at times but actual planning be left to the students.

❖ **Execution**

Once the project has been chosen and the details of the project have been planned, the teacher should help the students in executing the project according to the plan. Since execution of a

project is the longest step in the project method it needs lot patience on the part of the students and the teacher. During this step the teacher should carefully supervise the pupils in findings. This step is very useful because as a result of the project the pupils know the values of the information.

❖ **Record**

A complete record of the project should be kept by the students. The record should include everything about the project. It should include the proposal, plan and its discussion, duties allotted to different students and how far they were carried out by them. It should also include the details of places visited and surveyed guidance for future and all other possible details.

❖ **Role of the Teacher**

• In project method of teaching the role of a teacher is that of a guide, friend and philosopher.

• He helps the students in solving their problems just like an elder brother.

• He encourages his students to work collectively, and cooperatively.

• He also helps his students to avoid mistakes.

• He makes it a point that each member of the group contributed something to the completion of the project and in his process helps the shy and weaker students to work along with their classmates.

• If the students face failure during execution of some steps of the project the teacher should not execute any portion of the content, it puts a challenge to the students and thus stimulates constructive and creative thinking.

• It provides the students an opportunity for mutual exchange of ideas.

• Project should suggest them some better methods of techniques that may be used by them next time for the success of the project.

• Teacher should always remain alert and active during execution step and see that the project

goes to completion successfully.

• During execution of the project teacher should maintain a democratic atmosphere

• Teacher must be well - read and well-informed so that he can help the students to the successful completion of the project.

Merits of the project method:

• It is a method of teaching based on psychological laws of learning. The education is related to child life and the child acquires it through meaningful activity.

• It imbibes the spirit of cooperation as it is a cooperative venture. Teacher and students join in the project.

• It stimulates interest in natural as also man made situations. Moreover, the interest is spontaneous and not under any compulsions.

•This method helps the children to organize their knowledge.

Drawbacks of the project method

• Project requires a lot of time and this method can be used as a part of science work only.

• Though the method provides the student superficial knowledge of so many things it provides insufficient knowledge of some fundamental principles.

• In the project planning and execution of the project the teacher is required to put in much more work in comparison to other methods of teaching.

• Good textbooks on these lines have not yet been produced. • It is an expensive method as it involves tours, excursions, purchase of apparatus and equipment etc.

• The method of organizing instruction is un-systematized and thus the regular time table of work will be upset.

• Sometimes the projects may be too ambitions and beyond pupils capacity to accomplish.

Historical Method

It is believed that children's ideas and thinking follow the same historic route of original discovery of a scientific phenomenon. Therefore, some teachers advocate this method of tracing the growth of a theory or a principle through all the stages of its evolution, as a natural process of developing the subject. That is, to start from the discovery of the scientific phenomenon and pass through the actual course of its development from the earliest beginnings. This way of developing the topic is fascinating to the pupils and it appeals to them. The beginners can see how the beliefs of the scientists changed with time and with discovery of new facts. They will be able to observe how one theory replaced the other with the passage of time and will be able to appreciate the difference between facts and hypothesis. They will realize that a hypothesis or law is true as long as it can explain all observed phenomena. This realization has important educational value and helps inculcate proper scientific attitude. They can see the whole process of development of a scientific principle or phenomenon from the "original crude attempts at forming hypothesis to the modern refined method of investigation.

Another way of using this method is interesting incident or story of .the li Is to start with an particular scientific discoveries of scientists leading to a N ·. :ry such as Archimedes and his bath, Newtons curious thought over the falling of an apple which led to the discovery of two most theories in science. This way, pupils can appreciate the qualities necessary to become a successful scientist. They will also be able to realize that many scientific discoveries were made by chance. This method can be conveniently used for the exposition of important theoretical concepts in science.

The method has another important implication relating to the human side of scientific discovery. Following this method the teacher can develop and show science as a social venture, and how scientific discoveries have led to the transformation of society. The pupils

can also realize that scientists are engaged in tackling problems of immediate interest to every individual and society as a whole

The greatest drawback of this method is that it is a very slow process of teaching. Moreover, the study of how other scientists worked, though interesting, will not help the pupils, unless they themselves do something. The method receives an important consideration during the formulation of science syllabi.

Biographical Method

Young people are usually fascinated by interesting stories. Therefore, this method is often very convenient to teach science. The lives of the important scientists are described in an interesting manner and simultaneously their achievements are discussed in the class. The event of struggle and achievements of the great scientists arrest their attention and make the study of science interesting. The life history of scientists in stories provides great incentives to the study of science. In fact extracts from the lives of the scientists can most advantageously be used to introduce many topics, for example, the life of Galileo and the law of falling bodies, the cruise and the discovery of radium, Faraday and electromagnetic phenomena, Harvey and the circulation of 'blood, Newton and his laws, etc. The protagonists of this method of teaching science suggest that the pupil should try "to project himself into the life of the original discoverer, to experience his successes and frustrations, to appreciate his hopes and disappointments." Some experienced teachers are of the opinion that using the biographical method, a satisfactory syllabus in science could be built up through a study of the lives and works of the important scientists such as Copernicus, Galileo, Gilbert, Harvey, Boyle, Newton, Black, Priestly, Lavoisier, Davy, Faraday, Pasteur, Lister, Alexander Flemming, Rutherford, etc. They expect that a course could be developed around the stories of their achievements.

TEAM TEACHING

The present system of education demands too much from a teacher by curtailing his freedom. He has to teach same subject matter every year and he is forced to teach the same content to two or three section of the same class. It is very boring for him and stifles his interest in the subject. Sometimes he is assigned to teach the subject in which he has no interest to teach but he is forced to do so. More-over the present day classrooms are appropriate only for the average students. In these circumstances, when teachers and students have to work under so many constraints, we feel an urge to use team teaching.

Origin of Team Teaching

The concept of ·Team -Teaching has its origin from America during the mid-1950. It reached England in the 1960. J. Freedom's team teaching in Britain gives an account of its growth in the country. It has occupied a place for itself in schools and colleges.

Harvard University is the first institution which has initiated an internship plan in 1955. The second mile stone in team teaching is the project in Lexington (1957-64) which has been influenced by the Harvard programme.

Francis Chase of the University of Chicago has developed the need of team teaching to use the best teachers more effectively.

J. Leyod Trump made valuable contribution for the success of team-teaching. Team-Teaching was not only confined

Meaning and Definition of Team Teaching

The term 'team teaching' has been defined by several persons because they have designed and conducted experiments Lo understand the- nature of team teaching. Warwick has tried to define the term more comprehensively. According to him

"Team-teaching is a form of organization in which individual teachers decides to pool resources, interests and expertise in order to devise and implement a scheme of work suitable

for the needs of their pupils and the facilities of their schools."

Carlo-Olson has defined team-teaching as:

"An instructional situation where two or more teachers possessing complementary teaching skills cooperatively plan and implement the instruction for a single group of students using flexible scheduling and grouping techniques to meet the particular instruction."

Another definition of team-teaching is :

"An arrangement whereby two or more teachers, with or without teaching-aids cooperatively plan, instruct and evaluate one or more class groups in an appropriate instructional space and given *length of time* so as to take advantage of the special competencies of the team members."

It may be inferred from the definitions of team-teaching that it has the following characteristics:

It involves two or more teachers to teach a class.

In this type of teaching a group of teachers is responsible rather than an individual teacher.

A team or group of teachers of the same subject work together to deal a significant content to same group of students jointly.

It can be termed as co-operative teaching, in which individuals teachers plan to pool resources, interests and their expertise for teaching a content for the same group or class of students.

Every individual teacher gets appropriate instruction space and length of time so as to use special competencies of teaching content to a group of students.

A group of teachers shares responsibilities of planning, organizing, teaching, controlling and evaluating the same class of students.

In team-teaching the grotp of teachers has to consider the needs of their pupils and they should teach jointly to satisfy their needs and remove the difficulties of their students.

Types of Team-Teaching

There are different styles of organising team teaching in schools. One of the common methods adopted is that the teachers teaching the students of same standard and subject join together, collaborate and perform the task. The whole team can plan the lecture and discuss which teacher is best suited to lecture, for small group discussion, for guiding library work, for settmg P demonstrations and visual aids that can be used in presentation 1n large groups and for preparing evaluation materials. Each of the members in the team has a specific assignment.

All the students of four sections meet at the large hall for large group instruction. One teacher gives a lecture and another teacher demonstrates. This lecture is arranged after thorough preparation in consultation with the other teachers in the team. T he purpose of the lecture is to motivate the students and initiate t hem in the learning activity.

I eam teaching can be effective only when this lecture in a l arge group is immediately followed by small group discuss1on5 under the guidance of all the teachers in the team. *The* large g roup i plit up into small groups of homogeneous abilities and t he t e a c h e r pay individual attention and work as counsellor Or consultant to thee small groups. This homogeneous grouping can be accomplish e d on t he basis of students abilities, interests,

needs and achie v ement Another style of team teaching can be that the team members join together, discuss the topics, plan the work, prepare the teaching aids and then go to their respective classes and teach the subject matter.

In yet another approach, when a topic of common concern to different disciplines is to be discussed, teachers of these subjects after proper planning together, can go to the same class and teach the subject matter in coordinated manner. One teacher is followed by another teacher and the discussion is completed from each one's point of view. This may bring about the inter

relatedness of knowledge through discussion by different subject teachers.

Objectives of Team-Teaching

The teaching strategies have been designed to achieve certain objectives. The team-teaching has been evolved to realize the following objectives:

- To make the best use of expertise of teachers under team teaching.
- To improve the quality of teaching. The services of the expert teachers are shared by a large number of students.
- To develop the feelings of co-operation or group work in teaching-learning situation.
- To help the students, to satisfy the needs and difficulties relating to the special content.

Principles of Team-Teaching

The team-teaching is based upon certain general principles which are helpful in organizing team-teaching. The principles provide a guideline for planning and organizing team teaching. The following are the important principles of this team teaching.

Principle of Size and Composition:. The size of the group or class should vary according to the objective or purpose of team-teaching. For example, if the purpose of team-teaching is to remove the difficulties of the students in certain topic of a subject, obviously, the size of the group should be small involving the students who have similar type of difficulties.

Principle of Duties Assigning to Teachers of the Team: The team-teaching involves two type of tasks: lead lecture and group work cum follow-up work. Therefore, duties assigned to teachers should be appropriate according to their competencies of teaching. Every teacher cannot lead the lecture with excellence. Therefore, this task must be assigned to a competent person.

Principle of Learning Environment : Every subject requires its own learning situation or environment. Therefore, learning environment must be generated by employing appropriate teaching aids and equipment's, e.g., laboratory, workshop, field work, good library and

lecture room, etc.

Principle of Time Factor: The team-teaching is a well-organized teaching task, and therefore time schedule should be prepared by allotting appropriate time for lead lecture task and group-work or follow up task. In this type of teaching, time arrangement should be fairly fluid. ***Principle of Supervision:*** The focus of team-teaching is to develop the mastery over subject-matter by employing the expertise of teachers. The supervised-study is essential for assimilating the knowledge of a topic or concepts. The nature and duration of the supervision of the students activities depend upon the purpose of team teaching.

Procedure of Organizing Team-Teaching

The team-teaching serves several purposes of teaching and it has different forms or types. Therefore, it is difficult to provide a general procedure for organizing team-teaching, but it involves the following steps:

Step 1-Planning for Team-Teaching :

'"This step involves the following activities the team members. Which are decided by the team members.

- Deciding the topic to be taught.
- Writing the terminal objectives in behavioral terms.
- Identify the entering or initial behavior of the leaners of the group.
- Preparing a tentative schedule of teaching.
- Assigning duties to teachers, considering their interest and competencies during lead lecture (ii) follow-up work and (ii)supervision.
- Fixing up the level of instruction.
- Selecting appropriate teaching aids and demonstration equipment's for generating learning environment, deciding ways and means for evaluating the students' performance. Oral or written questions of practical work, etc.

These activities are finalized by the team of teachers who are taking part in the team teaching. Planning of team teaching expertise of every teacher must fully be utilized. There should not be imposition of activities on them.

Step 2 - Organizing team-Teaching:

The organization of team teaching is decided by considering the purpose of the learners of the group. The following are usuall general formed by the team of teachers:

- Determining the level of instruction. Some questions are asked to explore the background of the learners.
- Presentation of lead lecture by a competent teacher of the team. Other teachers listen to lecture and note down the elements of topic which are not easily understandable to the learners group or not approximately presented.
- Follow up work, the other teachers have to supplement the lead lecture by explaining the elements of the topic in a more simple way so that learners can understand easily.
- Providing motivation or reinforcement by teachers to the lead learners in both the situations, lead lecturer and follow up work.
- Supervising of students activities which are assigned in lead lecture or group work or follow up work. This stage is considered to be important for assimilation.

Every member of the team should be conscious about time schedule and about the duty assigned to him.

Step 3-Evaluating Team-Teaching :

The evaluation is an important aspect of any type of teaching. It is helpful to measure the performance of learners which determines the level of achievement of the objectives.. It also provides the reinforcement to team members. Thus, it involves the following activities:

Asking oral questions, writing questions and practical work. Each question should measure a particular objective of team teaching.

Taking decision about the level of performance and realization of the objectives.

Diagnosing the difficulties of the learners and provide the remediation.

Revising the difficulties and organizing phases of team teaching on the basis of evaluation of the students.

Advantages of Team-Teaching

The team teaching is a perspective and economical devices of teaching to the need of the students. It is highly flexible . It has the following major advantages.

- It creates the learning environment for better comprehension and mastery over the subject among the learners.
- It provides an opportunity for free discussion in the small group work.
- It provides an opportunity to the teachers to develop the professional status and competency in teaching by mutual sharing of ideas.
- It develops the team spirit and the team members utilize the best use of multimedia. Time and energy are saved by the team teaching. It maintains the discipline in the class and creates a conducive environment of learning.
- It is highly flexible method of teaching while traditional methods of teaching are rigid.
- It enables the students to become more aware of their own approach, knowledge of content and simultaneously to the other experts of the same area. It brings excellence of teaching in them.

Limitations of Team-Teaching

With all the advantages, the method has got some limitations.

It is very difficult to seek co-operation among teachers to work jointly in teaching-learning situation. There is no. mutual regard and respect among the teachers. Every teacher considers himself expert of the subject. Every teacher has his own style of teaching.

The teachers do not like to deviate from the routine method of teaching and they do not prefer

any change in system of education. Generally they are of the opinion that this can be used in Western countries not in Indian schools.

Suggestions regarding the Use of Team-Teaching

The team-teaching can be used effectively by incorporating the following suggestions:

• The research studies has established for its workability and effectiveness but its success will depend upon the way it works in practice. The meaning and understanding of team teaching should be given to the school teachers and favorable attitude would be developed among them towards team-teaching

• The success of team-teaching rests upon the co-operation and devotion of the teachers. Only those teachers who are willing to work in a team must be invited for this method.

• The teachers should not be assigned the duties but they themselves should prefer the activities of teaching. They should be given full freedom to work at various stages of team-teaching. It is always better to have a leader for the team.

HEURISTIC METHOD

'To learn science is to do science' is the current view of the veteran man of science and well- known Indian educationist Dr. D.S. Kothari. He further says, 'there is no other way of learning science.' This must be learnt at the beginning of the study of science, even at the school stage. This concept is not new. The man to initiate this move was Prof. H.E. Armstrong of City and Guilds Institute, London. He was the chief advocate of a special type of laboratory training-heuristic training and opined that real purpose of science was original investigation and discovery. Therefore the pupil must be put in the position of a discoverer or investigator to discover the principles of science for In-teacher education departments and institutions, pupil teachers should be trained for this type of teaching. Anderson, Warwick and other experts in the field of team teaching consider hierarchical structure and composition as a very logical and attractive arrangement. The success of team teaching plan largely depends upon a balanced team in which all the teachers feel their responsibility and co-operate willingly in organizing teaching himself.

Meaning

The term 'heuristic' has been derived from a Greek word 'heurisko' meaning to find out or discover. Prof. Armstrong defines it in these words: "Heuristic Methods of teaching are methods which involve our placing students as far as possible in the position of the discoverer- which involve their finding out instead of being merely told about things". The method requires that the pupil should approach his scientific studies from the position and in the spirit of a research worker, for science is not a subject to be talked about. It is a practical subject and the correct way of learning is by doing. Prof. Armstrong believed in doing and not in observing what was being done. So this method is opposed to the Demonstration Method in this respect.

Procedure

Each student is given a sheet of instruction and is required to perform the experiments concerning the problem in hand. The student performs the experiments following these instructions and may sometimes get a bit of guidance from the teacher. Some people are of the opinion that the student is to be told nothing. He should follow the instructions and do everything himself. But there are situations when even a little of guidance or hint from the teacher can do a lot of good.

The students work according to instructions, perform experiments and keep a recording their note books. They also put down the conclusions arrived at and the bearing which these conclusion have on the problem in hand.

Regarding the selection of the problems there is a view that the problems must be suggested by the pupils themselves, as far as possible. The students cannot take a lively interest if the problems are imposed from above. For, it is a demand for activity rather than receptivity, for discovery rather than dogma.

Method of Training

According to Westaway, another chief advocate of this method: "Essentially, the heuristic method is intended to provide a training in method. Knowledge is a secondary consideration altogether".

It has been further asserted that: "This method is formative, rather than informational. Such training if properly carried out, does cultivate painstaking and observant habits and encourages intelligent and independent reasoning. It does bring home to boys clear notions of the nature of experimental evidence, and boys do learn that answers to questions can often be obtained from experiments they can work for themselves.

Naturally when there is so much emphasis upon the fact that the pupil should dig out the problem himself and attack upon the problem himself and come to the truth himself, this develops ood t raining for h is future life. Comparatively the quantity of knowledge acquired

wi ll be far less, since this becomes a long and slow process when we put a small chap in the position of a discoverer.

Moreover, this method will truly and conveniently inculcate among the pupils certain scientific disciplines or attitudes. It will cultivate painstaking and observant habits and encourage intelligent among the pupils, which can be made use in the adult life. Also the students can imbibe the notions about the nature of experimental evidence, which helps to develop a different type of mental set or approach towards world problems.

In this context, Jerome Bruner also emphasized *'discovery learning technique.'* According to him discovery learning increases intellectual potency, intrinsic motivation and retention of what is learned.

Merits

• ***Psychological Method:*** This method is based on an important principle of psychology i.e., 'learning by doing' so the students get a chance of having direct firsthand experience by performing the experiments themselves.

• ***Development of Scientific Attitude:*** It develops scientific attitudes among the students by making them truthful and honest, for they learn how to arrive at decisions by actual experimentation.

• ***Habit of Diligence:*** Through this method students develop habit of diligence.

• ***No Home-task:*** Since the students carry out all their work in the school, the teacher has no worry about assigning or checking home task.

• ***Training in Scientific Method:*** This method prepares the students for life, imparting training in scientific method.

• ***Self-Dependent:*** It makes the pupils self-dependent, self-reliant and self-confident.

• ***Individual Attention:*** Teacher gives individual attention since all the students may not be performing the same practical at one time.

• ***Teacher-taught Relations:*** Because the students have to approach the teacher time and again to get guidance and explain their difficulties, the relation between the teacher and the taught becomes more intimate and healthy.

• ***Gain of Knowledge:*** The knowledge gained by this method is retained for a much longer time since the students learn by self-activity.

Limitations

• ***Lengthy Method:*** It is a long and slow process which makes it impracticable for prescribed syllabus to be covered within a specific period.

Stress 011 Heuristic Method : There is a tendency on the • part of the teacher to lay more stress on those principles of science which lend themselves to heuristic treatment at the cost of other more important aspects of the subject where practical work is not possible.

• ***Stress on Laboratory Work:*** As too much stress is laid on practical work, students form a wrong idea of nature of science. They begin to believe that science is something to be done in the laboratory, forgetting that laboratories are made for science and not science for laboratories.

• ***Not Useful for Tiny-tots:*** It is too much to expect that small children will discover everything themselves.

• ***Non-availability of Gifted Teachers:*** It pre-supposes a gifted teacher and small class, which are generally not available in our schools.

• ***Non- availability of books:*** No text-books are available for this method. So it demands extra work on the part of the teacher who is already overburdened.

•***Costly Method:*** It is very costly affair since it requires well equipped laboratories, well-stocked libraries and highly qualified and trained personnel.

• ***Grading of Problems:*** The grading of problems is not an easy job, It requires sufficient skill and training.

• **Discoveries:** Since the students have to learn everything only by self-activity and experimentation, the romance of modern scientific discovery remains out of picture for them.

REMEDIAL TEACHING

Remedial education (also known as developmental education, basic skills education, compensatory education, preparatory education, and academic upgrading) is education designed to assist students in order to achieve expected competencies in core academic skills such as literacy and numeracy.

Whereas special education is designed specifically for students with special needs, remedial education can be designed for any students, with or without special needs; the defining trait is simply that they have reached a point of under preparedness, regardless of why. For example, even people of high intelligence can be underprepared if their education was disrupted, for example, by internal displacement during civil disorder or a war.

Advantages and possibilities:

· Flexible instructional pace and flexible class participation

· Elimination of barriers of time and space

· Cost-effectiveness of online courses

· Electronic research availability (digital libraries and online databases) · A well-designed online course makes it easy for students to navigate and find the adequate information

Disadvantages and problems:

· Delayed feedback from the instructor

· Unavailable technical support from the instructor

· Lack of self-regulation and self-motivation

· Sense of isolation, caused by the lack of interpersonal communication and interaction among students or between students and the instructor, or caused by the use of monotonous instructional methods

· A poorly designed course interface makes students feel lost in seeking information

The role of the teacher in online remedial education

In order to provide a positive experience and to ensure the effectiveness of online remedial courses, the tutor's roles in designing and organizing the learning experience, providing technical advice and support, encouraging and facilitating discussion, encouraging participation, using a variety of forms of instruction, and resolving communication problems are crucial.[44]

Collaborative tools

A recent development in collaborative working and learning is the use of synchronous tools like web-videoconferences whereby learners meet online at a fixed time (synchronous) in an online classroom.[45] While web-videoconferencing is not a new phenomenon, tools like Skype, MSN Web Messenger and Adobe Acrobat Connect allow learners to efficiently communicate using free or low cost technology such as a simple desktop computer. Until recently, such basic technology would only allow for asynchronous learning, as for example in discussion groups.

A remedial teaching

Give positive reinforcement to pupils good behavior, and do not pay undue attention to their misbehavior. Do not try to change all the deviant behavior of pupils at once. Teachers should list out the problems and set the priorities with an aim to improve one or two of them at a time. Refer the cases to Student Guidance Officers/Teachers for follow-up action if the behavior problems of pupils continue or become serious. If necessary, student guidance officers/teachers may refer the case to the Psychological Services Section of the Education Department for individual assessment and remedial services.

The Advantages of Remedial Activities in the Classroom

A remedial activity is one that is meant to improve a learning skill or rectify a problem area. Remedial instruction involves using individualized teaching of students who

are experiencing difficulties in specific subject areas. Remedial instruction might be taught individually or in groups and targets academic weaknesses that may hinder learning. Remedial activities teach basic skills that are the foundation for learning a subject in greater detail, and such skills must be learned before students can develop a detailed understanding of the topic of study.

Learning Basic Skills

Students who do not have basic math and reading skills will benefit from attention to remedial activities in the classroom. Using phonics, Dolch words or basic multiplication tables as teaching tools will give students the basic skills they need to advance to a higher academic level.

Reinforcement

Students who have been out of school over summer, winter or spring breaks may benefit from remedial teaching over a week or more to reinforce skills they lost due to extended time away from school. Teachers might use flashcards, games or fun activities involving phonics and basic math to help students get back on the learning path.

Help for Dyslexia

According to research from Carnegie Mellon University, remedial reading instruction can help students with dyslexia overcome their reading difficulties by helping to rewire brain connections. The study, published in the August 2008 issue of the journal "Neuropsychologia," showed that 100 hours of remedial instruction is enough to help students with reading deficits related to dyslexia increase neural connections and increase reading proficiency over the long term.

Communication Skills

Students who suffer from speech disorders may have trouble with communication in the classroom. Speech disorders are often developmental and may respond to remedial

reading instruction. Teaching reading using phonics and sounding-out activities may help students with communication issues from speech-related problems become more academically proficient.

Encourage pupils' active participation in class activities

Remedial teachers should patiently encourage active participation in class. Pleasurable learning experiences may help enhance pupils' interest in learning.

Focus on the learning process

Teaching should not only focus on the transmission of knowledge. It is also important to see that pupils are benefited from the entire learning process. Teachers should provide ample opportunities in class for pupils to practise and think what they have learnt, and allow them to solve problems by different means. Teachers should also carefully observe the performances of pupils and give them appropriate assistance, feedback and encouragement so as to help them acquire the learning skills, solve their problems and understand their own capability, thus enhancing self-confidence and improving their learning skills.