CHAPTER - I  INTRUDUCTION

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Concept of Education

Education is a dynamic force in the life of every individual influencing his physical, mental, emotional, social and ethical development. Education has been described as means to modify the behaviour. Education implies experience, insight and adjustment on the part of man as he is stimulated towards growth and development. It is described as a process of development, man develops his intelligence and reasoning, receives knowledge, cultivates good habits, skills and essential human virtues. In short, Education enables a man to realize higher values of life which are essential for him to become ‘the roof and crown of all creations’. Education has been widely discussed and interpreted by different thinkers, philosophers, and educationists with reference to its aims, function and implication.

According to *Mahatma Gandhi*, (1937) “By Education, I mean an all-round drawing out the best in child and man body, mind and spirit”.

According to *Plato* (*428 BC - 346 BC*) “Education is the capacity to feel pleasure, and pain at the right moment. It develops in the body and in the soul of the pupil all the beauty and all the perfection which he is capable of. According to *Pestolozzi* (*1986*), “Education is the natural, harmonious and progressive development of man’s innate powers”.

We must remember that child gets education from his experience out of school as well as from those within. On the basis of
these ‘two factors, there are mainly two types of Education the formal Education and the informal Education. Formal education is consciously structured and deliberately planned with well defined objectives, instructional strategies and evaluation. On the other hand informal education is incidental and takes place without any formal setting and curriculum.

In the modern educational structure, both the types of education and factors of education occupy important place. They are inter-dependent. We cannot minimise the essential virtues like, social, moral, spiritual values in human life. Similarly we cannot ignore the significance of schooling, instruction and training. It is a truism that the present education is more technical, specialized and complex. It requires special arrangements and at the same time special institutions. To obtain these special arrangements or experience which brings about behavioural changes in a child, the child steps in to the formal agency of education created by the community or society - the school.

Schools try to impart systematic knowledge. It is in the school that a child learns appropriate human relationships that exist. It is here that the children become conscious of their achievements and failures.

The school must aim at a comprehensive programme for the physical, intellectual, moral, religious, cultural, aesthetic, social, vocational, domestic and recreational needs of the children to bring about their all round development. In this dynamic system of
education, the teacher cannot afford to sit in the ivory tower. There must be a healthy interaction between the teacher and the pupil through the medium of environment to bring about learning which in turn helps to bring about behavioural changes and all-round development in the child.

Teaching Learning Process

The role of learning is extremely important in the preparation of adolescents and youth for citizenship in a democratic society. The learning process represents the channel through which the adolescents strive to acquire the habits, skills, knowledge, attitude, values and appreciation, which are necessary for effective participation in a democracy. Learning therefore becomes a process by which changes in behavioural patterns are produced through experience.

Learning is brought about through teaching, teaching process is the arrangement of environment within which the students can interact and study how to learn. The process of teaching learning aims at transmission of knowledge, imparting skills and formation of attitudes, values and behaviour. Educationists have been trying to analyse the learning process in terms of the requirements of the individual and the society. The behaviourist school of educationists classified the learning process under three domains namely, cognitive, affective and psychomotor. (Bloom (1956) Simpson (1968) and Krathwhol (1964)). The development of an individual is made possible by realising the
objectives formulated on the basis of desirable behavioural patterns in
the three domains. They showed that if suitable instructional strategies
are employed, individual development efficient enough to contribute
for social development could be made possible through the realisation
of objectives to the maximum possible extent.

Teaching involves setting appropriate learning experiences for
students, and for that purpose includes selection and sequencing of
activities or kinds of interactions that would lead to expected learning.
Teaching is intended to learning, without learning teaching is
incomplete.

Learning is a natural and common attribute in any human being.
In common sense terms, the textual meaning of learning is, ‘to realise’
‘to become aware of, ‘to gain by experience’ and ‘to commit to
memory’. This suggests that learning results in ‘realising’ ‘becoming
aware of, ‘memorising’, it is also the result of ‘experience’. Learning
as a concept is well defined; it refers to relatively permanent change in
the behaviour resulting from experience. Education deals with positive
changes in behaviour. Teaching is purposive and leads to intended
(desirable) learning. Every teacher sets the target for students and
sets a direction for deciding what is to be done in order to enable
students to achieve these targets. These targets are regarded as
learning target, which students learn at the end of each teaching
situation. The term ‘instructional process’ can be used to denote a
Teaching situation and learning targets can be stated as objectives to be achieved through instructional process.

Teaching Learning Strategy

Teaching learning strategy is a set of planned activities which would enable the teacher to teach and the child to learn a given type of content so that a set of instructional objectives are effectively achieved. A strategy helps to give meaning to what is being taught and helps to use appropriate skills and activities in teaching a given material. But there cannot be only one instructional strategy to teach all types of content and to achieve educational objectives. A certain strategy may be found suitable for teaching science and developing in the child problem-solving capacity but may turn out to be of little help in teaching of language or social studies. Educationists have identified a number of instructional strategies to suit different types of content and for achieving different types of objectives.

Interactions and observations of a variety of teachers enabled identification of clusters of behaviours of teachers and students during the instructional process that could fairly seem distinct. Several such clusters of sequential behaviours of teachers and students for an explicit purpose came to be termed “teaching methods”. The term ‘method’ suggests a few defined steps to be followed in completing a task. It implies certain given conditions within which these steps can be applied systematically leading to achievement of the purpose of objectives for the task. The verbal Instruction presented through oral
medium is termed as lecture method. Teacher re-creating any process by operating it in front of learners is technically called as demonstration. Every instructional method is differentiated in respect of the kind of interactions it can generate, the role of teacher and learners, the potential it has for activating specific learner behaviour. Several such instructional methods have been identified and propagated for classroom teaching. Knowledge of these and competence to utilize them appropriately will enhance the teacher effectiveness.

Methods of Teaching

The teaching methods are classified as follows:

• Teacher Centred Methods; (Lecture, team teaching, demonstration) In these methods instructional interactions originate from the teacher. Students are the recipients in the process; they are led by the teacher through the process in the pre-decided route designed by the teacher. Though both students and the teacher are actively engaged in the process, the focus is on the presentation of learning experiences by the teacher.

• Learner Centred Methods: (Self-instructional methods, practical work, library study, assignments, projects) Here students are actively involved with the learning experiences individually. Teacher is in the background, he is the one who specifies the learning experiences, makes available these
experiences but is indirectly involved in the instructional process.

- Group Centred Methods; (Group discussion, small group discussions, debates, seminars, brain-storming, panel discussion, projects) Here students are engaged in the learning experiences essentially as ‘interacting groups’. That is, learning occurs through group interactions. Teacher is also an active participant in the group interactions, but, the student participation is central. Except the theme the process goes on spontaneously and not in any pre-decided sequence. These methods are generally useful in developing higher cognitive abilities.

Many of the above mentioned methods are evolved from practices, very few have been based on empirical work, learning theories and original research. Since teaching intends to learning, teaching strategies need to be planned based on the conditions and circumstances under which learning takes place. On the basis of knowledge and understanding of learning a teacher can set the conditions and guide the students towards learning which will contribute in attaining the prescribed educational goals.
Several theories of learning were framed by psychologists, each one attempting to explain the particular kind of change observed. It is not correct to claim superiority of one theory over another. Learning a language is not the same as learning science. According to Hilgards “The construction of a fully satisfactory theory of learning is likely to remain for a long time an uncompleted task”.

Learning theories are classified broadly into Association theories and Field theories. To an associationist, man is little more than a complex machine. His behaviour is largely, if not entirely, determined by his environment. His purposes or goals are often irrelevant. To a field theorist, man is an energy system, an adaptive, purposeful creature whose behaviour is determined by the manner in which he perceives his environment. Both of these schools have their factions so that not even all those who are classed as associationists, for example, are in complete agreement with one another on all relevant points.

Under the association theories are included the theory of connectionism, the conditioned response theory, Hull’s systematic behaviour theory, Guthrie’s theory of contiguity, and Skinner’s reinforcement theory. Under the field theories there are the Gestalt theory, Lewin’s topological theory and Tolman’s sign Gestalt theory.
<table>
<thead>
<tr>
<th>Learning Theory</th>
<th>Developed by</th>
<th>Educational Implication</th>
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<tbody>
<tr>
<td>Learning by Trial and Error</td>
<td>Thorndike (1874-1949)</td>
<td>Learning here is considered as the phenomenon of ‘stamping in’ correct responses and ‘stamping out’ incorrect ones as a result of rewarding and annoying consequences. Acquisition of skills</td>
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<tr>
<td>Learning by conditioning</td>
<td></td>
<td><strong>Programmed Instruction:</strong> It refers to the process of constructing sequences of instructional material in a way that maximises the rate of acquisition and retention and enhances the motivation of the student.</td>
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<tr>
<td>1. Classical conditioning</td>
<td>Ian Pavlov</td>
<td>Influence behaviour therapists to correct deviant behaviour in children</td>
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<td>2. Operant conditioning</td>
<td>B.F. Skinner</td>
<td></td>
</tr>
<tr>
<td>Hulls Drive Reduction theory</td>
<td>E.R. Guthrie (1896-1959)</td>
<td>Helps in developing need-based curriculum</td>
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<tr>
<td>Learning by insight</td>
<td>Jean Kohler (1925)</td>
<td>Children feel comfortable to solve problems using insight when provided with concrete material they can handle and manipulate.</td>
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<td>Sign Gestalt Theory of Learning</td>
<td>Edward C. Tolman</td>
<td>Emphasise the formation of cognitive map</td>
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<tr>
<td>Discovery Learning</td>
<td>Jerome. S. Bruner</td>
<td>Promote discover learning</td>
</tr>
<tr>
<td>Receptive learning</td>
<td>David Ausubel (1918-2008)</td>
<td>Useful for teaching abstract relationship, helps students retain important &amp; large information for longer duration</td>
</tr>
<tr>
<td>Mastery learning</td>
<td>Carlton Washburne (1922)</td>
<td>Completely knowing the facts principles and using them whenever it is needed.</td>
</tr>
<tr>
<td>Social learning theory</td>
<td>Albert Bandura (1925)</td>
<td>Is an effective technique to mould the behaviour of students in a wholesome manner.</td>
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Models of Teaching

The purpose of teaching is to increase capacity to learn the multifaceted thing we call intelligence. We find that education can greatly affect intelligence and that those we call models of teaching are one way to organize intelligence oriented education. Models of teaching are really models of learning. As we help students acquire information, ideas, skills, values, ways of thinking and means of expressing themselves, we are also teaching them how to learn. In fact, the most important long term, outcome of instruction may be the learner’s increased capabilities to learn more easily and effectively in the future, both because of the knowledge and skill they have acquired and because they have acquired and have mastered learning processes.

Significance of Science Education -

Science has got an important role in shaping human society. This is an age where the modern society is completely drawn into the scientific environment and science has become an integral part of our life. A citizen of the modern world sees the countless manifestations of science all around him. The effects of science on human life has become so great and are potentially so much greater than those who have no understanding of them. The Indian Education Commission (1964 - 66) observed that education need to be science based and in coherence with Indian culture and values, which can provide the foundation and it can also act as an instrument for the nation’s
progress, security and welfare. The present century is marked by the explosion of scientific knowledge, which has resulted in several educational innovations. Science education should produce informed citizens prepared to deal with science related social issues. A man should possess proper knowledge of science to lead a successful life. It helps in realising the application of scientific knowledge to new situations for the solution of problems in day today life. It helps in exploring their world, and to enjoy and appreciate their surroundings.

The aim of science teaching is not the acquisition of information and a few skills but to attain the understanding of the relationship which connects the answer to the problem. Science education is an important component of the education system. It should contribute in the solution of the problems of the country by developing desirable understandings, skills, abilities and attitudes. The greatest challenge is to humanize science i.e., to make it relevant to human needs and aspirations. The report of NGERT on Curriculum and Teaching in Secondary Schools (2008) stated that for developing scientific attitude of mind and to inculcate good personal and social habits such as objective and unbiased love for truth, inquisitiveness, accuracy, precision, correct health habits, habit of enquiry, initiative and logical thinking, proper methods should be adopted for science teaching.

The Secondary Education Commission (1964) has recommended that every secondary school pupil should study general science as a compulsory subject, so that he gains a basic quantum of
scientific knowledge as a part of his general education. In addition, provision should be made for providing elective subjects in science for those students who want to pursue higher studies.

Science is an integral part of school curriculum. The inclusion of science in the curriculum should satisfy the intellectual, utilitarian, vocational, cultural, moral and aesthetic values. Besides these, the teaching of science imparts training in the ‘scientific method’ and develops scientific attitude, which are very valuable and at the same time are transferable to other situations in life. According to Bruner (1966) science should be taught as a way of thinking and the process skills are best acquired by discovery. So it is very essential to reshape the teaching of science in accordance with the needs and requirements of modern society.

Biological science at secondary level

Biological science deals with the study of living organism, their living environment and various interactions between living things and environment. This Branch of study helps an individual to identify his position with respect to his environment and helps one to think logically and broadly to live up with the biological principles. Moreover education in biology helps to shape modern scientific outlook and overcome the superstitions of the past. So biology is included in the core curriculum as a compulsory part of education. Teaching becomes effective and more systematic only when the teacher is fully aware of
the aims and values of teaching, because the basic principle of teaching is “know what you do and only do what you know”.

**Aims and Values of Teaching Biology**

The process of bringing about perceptible behavioural changes in pupils when subjected to instructions is known as instructional objectives. The instructional objectives are Knowledge, Understanding, Application, Skill, Interest, Attitude, Abilities, Appreciation and providing vocational career.

**Knowledge:** To impart knowledge is the basic aim of education and so it is naturally the basic aim of teaching of any subject including life science. The knowledge objective of biology is to impart knowledge of natural phenomenon, scientific terminology, scientific concepts, and modern inventions of science, importance of animal life and plant life, environment and so on.

**Understanding:** This objective deals with interpretation of data, concepts, laws, illustrating scientific terms, concepts, facts, phenomenon's, explaining scientific terms/facts, concepts, principles, discriminating between different facts, concepts, identify relationship between various facts, concepts, phenomenon and so on.

**Application:** This objective is considered to develop the ability of analysing, giving reason, formulate hypothesis, confirm or reject a hypothesis, infer, predict, find cause and effect relationships.
Skill; This objective deals with the psychomotor abilities like handling apparatus, drawing, constructing, and manipulative, observational and recording skill.

Interest; Objective of developing interest in life science is to take up scientific hobby, visit places of scientific interest, undertake science projects, read scientific literature, collect specimen, participate in science related programmes.

Attitudes: Development of scientific attitude is another important objective of life sciences which deals with removal of superstitions, stresses on objectivity, persistence, honesty, suspending judgement and so on.

Abilities; By the teaching of life science we intend to develop abilities like ability to use scientific method, problem solving, process information, organise scientific programmes etc.

Appreciation; This objective of life science deals with the development of appreciation capability towards contribution of scientists, history of scientific development, progress of science etc.

Providing Vocational Career: In the modern world majority of career courses depend to a large extent on the basic knowledge of science. Life sciences open a vast field of opportunities for taking up any vocational course and choose a career.
Choice of a Method for teaching Biology

Biological science is a subject which emphasises both process and product. As such it should be taught through problem-solving techniques or discovery approach. Child’s curiosity and exploratory attitude should be fully utilized in arriving at solutions to the problems which he comes across in learning science. The knowledge which the child acquires only through memorisation of facts cannot be of much use to him in learning science. Emphasis must be placed on understanding the environment and the physical phenomena. The environment can become a very effective source for learning science for the child. The child can relate scientific knowledge to real life, if he is allowed to learn through observation and analysis of the observed phenomena. The teacher is required to select the most suitable method according to the topic. He should exercise his wisdom in selecting the needed experiments in life science subjects. But in reality due to lack of well equipped laboratories, libraries and other limitations many of these methods of teaching biological science have not been given a trial in our schools. One cannot question the validity of Bruner’s firm faith in the efficacy of discovery learning. Undoubtedly personal first-hand experience always remains superior to listening to verbal instruction in class. That does not mean that every bit of knowledge one acquires is always the result of first hand experience. There is a need for verbal instruction also in a class which lays foundation for meaningful learning. In this context we need to consider
the contribution of David Ausubel an American educator. Teachers have the responsibility of conveying large amounts of information meaningfully within a time-frame. They need to perfect their skill in lucid presentation. Ausubel calls this as expository method resulting in meaningful reception learning under the model of teaching and the model is called as “Advance Organizer Model.

Need and Significance of the Study

The relative popularity of biology reflects a changing emphasis in the philosophy of curriculum. In the past more importance was given to the descriptive and taxonomic subject matters in the teaching of biology but now-a-days more emphasis is laid on the concept of evolution and the history of life on earth, since evolution is now considered more of a law than a theory, more emphasis is laid on teaching of mechanism of evolution than that on the details of taxonomy.

The traditional content has been replaced by modern discoveries in the fields of cell biology, basic genetics, bio engineering and bio-technology. Newer areas such as ecology, demography and population genetics give meaning to studies of diversity and evolution.

In place of giving training to students to prematurely become specialists in narrow fields, the knowledge is imparted in general understanding of the principles and broad values of biology. Importance is now placed on application of ideas of biology, in community affairs. So instead of merely describing the ecology of
rainforest, consideration is given to the issue of whether or not rainforests should be logged for timber, cleared for crop growing or flooded by hydro electric schemes. Questions of environmental and biological management and the resolution of such conflicts in society are increasingly seen to be a central concern of the biology programme. Teaching of biology at school is seen as performing a social role like overcoming alcoholism, drug abuse, obesity, occultism, pseudo religious mystiques and other counter-productive social trends. It also helps in programmes of family planning, health and nutrition, agricultural policies and the utilization of natural resources.

Teaching process is increasingly recognized to form the core of the educative process. New alternative strategies need to be developed and investigated to reach the needs of biological science teaching. The different methods which are followed at the secondary school stage are the lecture method, project method, problem solving, heuristic, and discussion method.

But in reality only Lecture method dominates the Teaching Learning process. Sometimes if the Lecture is not interesting, effective and not systematically presented it develops mental fatigue and deficiency in learning especially when large amount of information has to be conveyed. To make Lecture method more practical, effective many research studies have been undertaken. The models of teaching are one such attempt to make teaching more systematic and scientific. The Advance Organizer Model by David Ausubel attempts to organize
learning through effective lectures. The present investigator working as a teacher educator and teaching methods of teaching biological science has found from her experience that majority of teachers are adopting lecture method for teaching biology, this may be due to lack of practice and non-availability of time and suitable innovative models. It is presumed that a study like this will be useful in collecting necessary data about the Advance Organizer Model and shall make the teaching learning process in biology more effective and meaningful.

Statement of the Problem

The advance organizer model learning package was developed on the topic “The living world” in biology for secondary level and its effectiveness has been experimentally assessed in a class room setting. The study is entitled “Developing Advance Organizer Model Learning Package in Biology for Secondary Level”

Terminology

Developing

The term developing means the process through which desired changes are brought about with the help of appropriate means. In the present study, developing means act or process of preparing, executing and evaluating the effectiveness of Advance Organizer Model learning package.

Advance organizer model

The advance organizer model is developed from Ausubels theory of meaningful verbal learning. The basic idea underlying this model is that learning of new information can be facilitated through
manipulation of the learner’s cognitive structure. According to Ausubel, the purpose, which the advance organizer serves, is “to provide specifically relevant anchoring ideas for the more differentiated and detailed that is subsequently presented” (Ausubel, 1977)

Learning Package

Learning package is a set of instructional materials prepared in a systematic order to gain knowledge and skills on a specific topic and the material can be used for instructional purposes.

Biology

Biology is the scientific study of the life and structure of plants and animals and the study material has been developed on the topic “The living world“ of standard IX of state board of Karnataka

Objectives

1. To develop Advance Organizer Model (AOM) Learning Package for biology education at the secondary level.

2. To expose the learning package to the secondary school students in an experimental setting.

3. To find out the achievement of secondary school students who learnt biology using AOM Learning Package.

4. To find out the achievement of secondary school students who learnt biology using conventional instruction (Cl)

5. To compare the effectiveness of Advance Organizer Model (AOM) Learning Package and Conventional Instruction (Cl) on
students achievement in knowledge, understanding, application and skill in biology.

6. To suggest innovative instructional strategies for biology education at secondary level.

Hypotheses

- A learning package based on Advance Organizer Model is plausible for biology education at the secondary level.
- Advance Organizer Model (AOM) Learning Package is more effective than conventional Instruction (CI) on student achievement in biology.

Scope and limitations

The major aim of the investigation was to develop Advance Organizer Model learning package in biology at secondary school stage (class 1X). The techniques of preparing Advance Organizer Model lesson transcripts are explained and its effectiveness is tested by conducting an experiment with a pre-test, post-test design.

It is expected that the findings of the investigator will help curriculum planners and those who are connected with the educational field, to understand the effectiveness and necessity of the application of this model in the teaching of biology.

The limitations of the study are mostly accounted with conducting an educational classroom experiment. First of all, the learning package for the study was prepared only on one unit selected from class IX. The study was confined to only two divisions of the class IX of a Girls High school in Bangalore. While owing the
limitations noted above, the investigator hopes that the findings of the study will be of use to teachers and other educational workers in understanding the application of the Advance Organizer Model in realising the objectives of teaching Biology and also systematising the presentation technique of teaching biology.

Organisation of the Report

Chapter 1 - The introductory chapter deals with the context need and significance of the study, the statement of the problem, definition of terms, objectives, hypotheses, scope of the study and its limitations.

Chapter 11 - The theoretical background of models of teaching and details of the Advance Organizer model are explained in this chapter.

Chapter 111 - A review of research conducted on models of teaching and advance organizer model in India and Abroad has been given in the third chapter.

Chapter IV - The methodology of the study, the details regarding the sample, tools and techniques, experimental design and procedure and statistical techniques applied are presented in this chapter.

Chapter V - The details of the Advance Organizer Model Learning Package developed for the experimental study are given in this chapter.

Chapter VI - The analysis of data, the tenability of hypothesis and the interpretation of the findings are stated in chapter VI.

Chapter VII - The final chapter presents a resume of the study, its major findings, educational implications and future directions.