Chapter-02
Review of Related Literature

2.1 Introduction
2.2 Background of Theoretical Literature
2.3 Philosophy behind Models of Teaching
2.4 Advance Organizer Model
2.5 Review of Previous Research Work
2.6 Summary of the Previous Related Researches
2.7 Significance of the present study
Chapter-02
Review of Related Literature

2.1 Introduction

Literature is the mirror which reflects the past views and presents the future prospective. It is unwise and wasteful to precede any study without knowing what has gone before. The previous literature gives a guideline and develops insight into the problem. Hence, the review of literature is an essential aspect of any research work.

"The Review of literature may be comprehensive inclusion of everything known on a given research topic and its related or a short summary of the literature most pertinent to the specific topic under study."¹

- Best and Khan

"The literature in any field forms the foundation upon which all future work will be built. If we fail to build the foundation of knowledge provided by the review of literature our work is likely to be shallow and naive and will often duplicate work that has already been better by someone else."²

- Carter V. Good

"Practically all human knowledge can be found in books and libraries. Unlike other animals that must start a new faith with each generation, man builds upon the accumulated and recorded knowledge of the past. His constant adding to the vast store of knowledge makes possible progress in all areas of human behavior."³

- John. W. Best

The phrase ‘review of literature’ consists of two words: Review and Literature. The word ‘review’ means to organize the
knowledge of the specific area of research to evolve an edifice of knowledge to show that his/her study would be an addition to this field. The word "literature" has conveyed different meaning from the traditional meaning. Here the term literature refers to the knowledge of a particular area of investigation of any discipline which includes theoretical, practical and its research studies.

The review of literature is very important on the part of the researcher to peep into the findings of the researches already done in the area undertaken so that the existence knowledge related to the problem may be reviewed holistically at a glance. It examines the recent research studies that act as a basis for the proposed study and also appraises the shortcomings and informal gaps in secondary data sources in it. The review of literature not only strengthens the conceptual framework of the study but also provides methodological clarity as well. It indicates the clear picture of the problem to be solved.

2.2 Background of Theoretical Literature

Review of related literature besides allowing the researcher to acquaint one-self with current knowledge in the field in which one is going to conduct her research.

The related literature in any field forms the foundation on which all the future will be built.

2.2.1 Meaning of Review of related literature

The phrase review of related literature consists of two words, review and literature. In the field of research the word literature indicates towards a knowledge which is practical and is useful for research purpose. Thus literature refers to the knowledge of a particular area of investigation of any discipline which includes theoretical, practical and its research studies. Review
means to organize the knowledge of the various field in which research has been done and to verify the utility of these studies for a particular problem area.

According to W.R. Borg,

"The literature in any field forms the foundation upon which all future work will be built. If one fails to build the foundation of the knowledge provided by the review of literature our work is likely to be shallow and naive and will often duplicate work that has already been done better way by someone else."4

Related literature means all types of books, letters, magazines published and unpublished investigation, journals, abstracts, essay, articles etc.

The first step in review of related literature is identifying the material that is to be read and evaluated. The identification can be made through the use of primary and secondary sources.

In primary sources the researcher reports once own book directly in the form of research article, books and monographs. Such sources provided with information about a study that can be found elsewhere. Primary sources give the researcher a basis to make its own judgment of literature.

In secondary sources, the researcher usually attempts to cover important studies in an area reported in abstracts, journals, media of education, education index, bibliographies etc.

Here the disadvantages are that the researcher is depending upon someone else’s judgment about important and significant aspect of the study.

The use of above two resources depends upon nature of problem and researcher must therefore, develop the expertise to use resources with efficient use of time and energy.
2.2.2 Definition of the Related Literature

Practically all human knowledge can be found in books and libraries. Unlike other animals they must start a new with each generation man builds upon accumulated and recorded knowledge of the past, the constant adding to the vast store of the knowledge makes possible progress in all areas of human endeavor.

The review of related literature however is an important as any either compartments of research process and it can be conducted quite painlessly if its approach is an orderly manner. Some of the researches even find the process quite enjoyable.

2.2.3 Objectives of the related literature

The review of related literature enables the researcher to define the limits of one’s field. It has following objectives:

- To provide the information about how many research have been done related to the study.
- To provide the library skills required by the researcher for the thorough survey of literature.
- Be helpful in operational definitions, limitations, hypothesis formation of the problem.
- To discuss the specific purpose served by the review of related literature.
- To describe the procedure the researcher should adapt in organizing the related literature.
- To elect appropriate literature method.
- To be helpful in the analysis and interpretation of the information.
- To provide necessary principles, thought, definitions, and research question for the research.
➢ To provide help for some important reference materials and research journals for the research to consult with the problem selected for research.

### 2.2.4 Need Of Review Of The Related Literature:

A literature is an evaluation of report of studies found in the literature related to researcher’s selected area. It gives a theoretical basis for the research and help to determine the nature of the present research. A literature review goes beyond the search for information and includes the identification and articulation of relationship between the past literature and the field of the present research. While the form of the literature review may vary with different types of studies, the basic purpose remains constant.

For any worthwhile study in any field of knowledge the researcher need and adequate familiarity with the work which has already been done in the area of the one’s own choice. This is likely to help the researcher in planning the study properly. It is needed in these ways:

- To provide a source of problem to study.
- To identify and select the problem of research.
- To review the related previous research.
- To enable the researcher to define the limits of the problem areas.
- To avoid unintentional duplication of well established findings.
- To know previous recommendations.
- To plan and conduct the research.
- To know clarity about tools, technique and methodology.
- To form the base for the new research, because if it is not based on thorough review of the literature it becomes an
isolated entity as it would be not relevant to what has been
done before.

Thus, the review of literature indicates the clear picture of
the problem to solve and give the direction to researcher for the
research related work.

2.2.5 Importance of Review of the Related Literature:

Every piece of ongoing research need to be connected with
the work that already been done to attain an overall relevance and
purpose. The review of literature thus becomes a link between the
research proposed and the studies already done. It tells the
researcher about the aspects and the studies already done. It tells
the researcher about the aspects that has been already established or
concluded by other researchers. It also helps to project the current
research work in the proper prospective. It establishes the frame
work or background in the field and thus provides the setting in
which the researcher reports the new study. It also provides the
summary of thinking and the research necessary for him to
understand the study. Moreover, it determines the researcher’s
credibility. Thus, related literature gives the vision and direction to
the researcher. The past researches guide the researcher for
different steps of the research.

A brief survey of preview research and writing of
recognized experts provide evidence that the researcher is familiar
with what is already known and what is still unknown and untested
since effected research must be based upon part knowledge. This
step determines the duplication of what has being done and
provides useful hypothesis and helpful suggestions for significant
investigations.
The related literature helps the researcher in following ways:

- To gather and maintain up to information.
- To avoid replication and help in defining limits.
- To derive sources of hypothesis and discovering variables.
- To show a way in developing accurate knowledge.
- Get idea about appropriate methodology.
- To get an idea about appropriate tools and techniques to be used in present research.

2.2.6 **Source of Educational Research:**

Library is one of the best sources of the educational research. It is the storehouse of the knowledge and wisdom as accumulated since the beginning of the time and because of its tremendous assortment of materials and endless quantity, variety and complexity.

As a researcher one should have sound proficiency in skill of using and locating the useful knowledge, which can be as follows.

- Ability to locate the source.
- Browse through multiple sources quickly.
- Finding relevant material.
- Organizing the relevant accumulated material.
- Interpreting the knowledge.

**Important sources of Educational literature:**

- Educational Indices.
- Educational abstracts.
- Encyclopedias.
- Documents.
- Dictionaries.
- Bulletins.
- Bibliographies.
2.3 Philosophy behind Models of Teaching

This chapter is specially designed to give an insight into the theory of ‘Models of Teaching’ with special reference to The Advance Organizer Model (AOM) of the Information Processing Family.

Human beings are born with latent urges, abilities, capacities, interests, aptitudes and other personality traits. It is the prime concern of education to stimulate and guide these undeveloped capabilities to the most desirable channels. The prime objective of the present education is to meet the emerging challenges of the process of globalization. To carry out these multidimensional objectives suitable Instructional strategies are essential. This led researchers to explore various methods and techniques, which resulted in a balanced and integrated development of cognitive, affective and psychomotor behaviour of the pupil.

In-depth knowledge about diverse philosophies of teachings will help teachers to guide the learners more optimally. Vital subject matter, which has values in and out, should be chosen for instruction. Teacher should understand and implement predetermined objectives in measurable terms for pupil achievement. Teacher can adopt a problem solving approach in teaching where decision-making skills are emphasized. In order to help teachers in this regard there are selected principles from the psychology of learning which need to model and implement. To meet the Instructional goals, a number of teaching strategies have
been developed by educationists and psychologists based on firm learning theories. But there is no single best way that can be employed in all situations. The best technique is the one, which will be most effective for reaching a particular goal in a given situation. This is the philosophy behind Models of Teaching.

➢ Models of Teaching

Teaching means helping students to learn well. Powerful learners have a wide range of strategies for acquiring knowledge. Models of Teaching were designed to impart to learners such strategies, which will help learners to think clearly and wisely and build social skills and commitment. They help students to acquire information, ideas, skills, values, and ways of thinking and means of expressing themselves in a nutshell. They are taught how to learn. Models of Teaching include many but not all of the major philosophical and psychological orientations towards teaching and learning. Each of them has coherent theoretical bases.

The models approach to teaching was first described by Joyce and Weil, who defined a model as a pattern or plan which can be used to shape a curriculum or course to select Instructional material and to guide teachers action. Eggen defines Models as prescriptive teaching strategies designed to accomplish particular Instructional goals. Model differs from general teaching strategies because of this principle. General approaches to teaching are considered to be applicable to all teaching situations. But these Models of Teaching are not cure-alls or applicable to all teaching situations. De cecceo (1968), making a distinction between teaching models and a theory of teaching says that, models do not have the rigor of tested theories. Some useful models may eventually give way to empirically tested theories. Models of
Teaching is a tool to help good teachers teach more effectively by making their teaching more systematic. But they are not substitute for teaching skills. They are rather complementary.

A model of teaching consists of guidelines for designing educational activities and environment. It specifies ways of teaching and learning that are intended to achieve certain kinds of goals. The use of models requires an ability to identify different types of Instructional goals so that specific model can be selected to match a particular goal. A teaching model can be considered as a type of blue print for teaching (Eggen, Kauchak and Harder, 1979).

Models of Teaching are really models of learning. They are designed to bring about particular kinds of learning and to help students become more effective learners. It helps students to acquire information, ideas, skills, values, and ways of thinking and means of expressing themselves. It teaches the students, ‘how to learn’ (Joyce and Weil 1972). Increasing aptitude to learn is one of the fundamental purposes of these models. Models of Teaching enable the students to become powerful students (Joyce and Weil 1972).

➢ Classification of Models

Educators, Psychologists, Sociologists, System analysts, Psychiatrists and many others have developed theoretical positions about teaching and learning. A number or educationists have developed Models of Teaching from different sources such as classroom situations, research in psychology and training, therapies and theories. But Bruce Joyce and Marsha Weil brought about the revolutionary changes in Instructional strategies.

Joyce and Weil grouped the models that they have discovered on the basis of their chief emphasis - the ways they
approached educational goals and means. They have organized these models into four families:

1. **The Information Processing Family**

   The models in this family are designed to teach students the skills of learning through thinking. They aim at increasing student’s ability to seek and master information, organize it, build and test hypothesis, apply what they are learning in their independent reading and writing and their exploration of themselves and the world around them.

2. **The Social Family**

   Man is a social creature. The models under Social Family range from the simplest processes of organizing students to work together to elaborate models that teach democratic social organization, analysis of major social problems and critical social values and issues. The models in this family emphasize the relationship of the individual with the society or other person. The core objective is to help students learn to work together, to identify and solve problems, either academic or social in nature. Consequently, with respect to goals, models from this orientation, give priority to the improvement of the individual's ability to relate others, the improvement of democratic processes and the improvement of the society (Joyce and Weil 1978).

3. **The Personal Family**

   The models in this family focus on the individual and give emphasize on the development of integrated feeling, thinking self-
the personal identity. They shape the environment around the capacity for self-education and the need to develop self-awareness and understanding. Models belonging to this family, share an orientation towards the individual and the development of selfhood. The emphasis of this model is on developing an individual into an integrated confident and competent personality. They attempt to help students understand themselves and their goal, and to develop the means for educating themselves.

4. The Behavioural Systems Family

The models in this family are developed taking into consideration the human beings ability to modify behaviour in response to tasks and feedback. These models are used in a wide variety of application from teaching information, concepts and skills, to increasing comfort and relaxation, decreasing phobias, changing habits, and learning to control one’s behaviour. These models are evolved from attempts to develop efficient systems for sequencing learning tasks and shaping behaviour of the learner and describe them in terms of visible behaviour rather than understanding an unobservable behaviour.

➢ The Teaching Act-Three Phase Approach

Teaching is often thought of as something that comes rather naturally to individuals who know their subject. Teaching is a triad of sequential interrelated acts or phases. A teacher who develops any learning experiences first plans then implements his plans and finally evaluates the success of the learning activity (Eggen, Kauchak and Harder, 1979).

1. Planning Phase

In the planning phase the teacher establishes goals, defines it in terms of measurable objectives and selects a teaching model to
accomplish these goals. In short, to be able to perform planning effectively, a teacher must have clear precise goals in mind as well as a number of teaching strategies available.

- **Instructional and Nurturant Effects**

  The teacher has to think of another crucial aspect while planning the lesson. This is about Instructional and Nurturant effects. The effect of an environment can be direct or can be implicit in the learning environment. The Instructional effects are those directly achieved by leading the learner in certain directions. The Nurturant effects come from experiencing the environment created by the model.

2. **Implementing Phase**

In the implementing phase, the teacher utilizes a particular model to accomplish the goals established in planning phase. In the implementation stage, learning activity can take many forms such as discussion, lecture, laboratory activity or simulation (Joyce and Weil 1978). Each model is based on some theory that has been available for many years. To translate a theory into practical form Joyce and Weil employed a set of four concepts: Syntax, Principle of Reaction, Social System and Support System. The operation of each model is described within this structure.

- **Syntax**

  Syntax or phasing of the model describes the model in action. It is described in terms of sequence of events called phases. Each model has a distinct flow of phases.

- **Principle of Reaction**

  Principle of reaction guides the teacher’s response to the learner. It guides the teacher how to regard the learner and respond accordingly.
➢ **The Social System**

The social system describes students’ and teachers’ roles and relationship and the kinds of norms that are encouraged. The leadership roles of the teacher vary greatly from model to model. It refers to additional requirements beyond the usual human skills, capacities and technical facilities necessary to implement a model.

3. **Evaluating Phase**

The teacher’s success in accomplishing the goal is measured in the evaluating stage. Here teacher attempts to gather information that can be used to determine whether his teaching has been successful.

Every teacher faces a wide range of problems in the classroom. The Models of Teaching give ample scope to the teacher to adapt to suit the classroom requirement. Educational goals have been divided into three main areas—Cognitive, Affective and Psychomotor. Among these areas, our elementary and secondary schools are primarily oriented towards goals in the cognitive domain. Cognitive goals are primarily concerned with the intellectual growth of individual. An important set of goals in this cognitive domain is called information processing. An effective teacher is the one who applies the Models of teaching resourcefully and creatively to solve his problems.

➢ **Information Processing Models of Teaching**

The information processing system of the human being is a set of ideas that provide anchors for new information or ideas as these are received and which provide a storehouse when new meanings are acquired. As this information processing system acquires new information and new ideas, it recognizes itself to accommodate those ideas and thus it is in a perpetual state of
change. New ideas and information can be usefully learned and retained only to the extent that they are retainable to already available concepts or proposition, which provide ideational anchors.

Information Processing Models share an orientation towards the information processing capability of students and towards the systems that can improve their information processing capability. Information processing refers to the ways people handle stimuli from the environment, organize data, sense problems, generate concepts and solutions to problems and employ verbal and nonverbal symbols.

Some Information Processing Models are concerned with the ability of the learner to solve problems and thus encourage productive thinking and some other are concerned with promoting general intellectual ability.

➢ Goals of Information Processing Models

Information Processing focuses attention on the acquisition of knowledge through an analysis of data gathered from the environment. It also helps the students to develop the thinking skills, which will allow them to learn on their own.

The goal of the model is to help students develop schemata and to structure knowledge. It is designed to teach organized bodies of content or help learners organize already understood concepts and generalization into an overall schema. A model can very effectively serve two primary functions. First, it can be used as a means for organizing content to be taught in an entire course, a unit within a course, or a single lesson. It is an aid for helping the teacher to decide on the scope and sequence of the content and it can aid the students as a guide in their progress throughout the
material. A model is an organizing scheme for the content, the specifics of which were presented separately in each of the succeeding chapters. Secondly, the model helps the learners structure previously learned concepts and generalization into comprehensible schemata. Only creative, flexible, and resourceful teachers will achieve the maximum benefit from the Models of Teaching. Teachers who are interested in Information Processing goals have a dual objective. One is to help students acquire bodies of useful information, and the other is to help them develop the thinking skills, which will allow them to learn on their own.

Information processing teaching strategies are based upon a relatively new movement in psychological thinking which views the learner as an active investigator of environment rather than a passive recipient of stimuli and rewards.

Eggen, Kauchak, and Harder state that the major goals of Information Processing in classroom are the development of intellectual capabilities and acquisition of content. According to them, the information processing activities in classroom have the following three characteristics:

1. Information is attained by students.
2. The data are processed by students into useful concepts and generalizations.
3. Information is converted into more useful form.

Thus information processing occurs in the classroom, when learners are actively involved in analyzing data to form abstractions such as concepts, generalizations, and theories. Models belonging to this family are given below.
Models | Major theorists
---|---
1. Inductive Thinking Model | - Hilda Taba
2. Inquiry Training Model | - Richard Suchman
4. Concept Attainment Model | - Jerome S Bruner
6. Advance Organizer Model | - David P Ausubel
7. Memory Model | - Jerry Lucas

(Joyce and Weil 1978)

Among these models Advance Organizer Model is useful to structure extended curriculum sequences or courses and to instruct students systematically in the key ideas of a field. The model can be shaped to teach the skills of effective reception learning. Critical thinking and cognitive reorganization can be explained to learners and they can apply these techniques independently to new learning. Whenever ideas or information need to be presented renewed or clarified the Advance Organizer Model is useful. After introducing new material by using Advance Organizer Model, deductive presentational way can be followed by inductive concept attainment activities that reinforce the material or that informally evaluate student’s acquisition of the material.

2.4 Advance Organizer Model

Advance Organizer Model is based upon the Learning Theory of Meaningful Verbal Learning formulated by David P Ausubel, an unusual educational theorist. The theory of Meaningful Verbal Learning applies to situation where the teacher plays the role of lecturer or explainer. The main purpose is to help students acquire subject matter.
The Ausubel model is a deductive information processing model designed to teach interrelated bodies of content. He firmly espouses the view that each academic discipline has a hierarchically organized structure of concepts, which form the information processing system of that discipline. He conceptualizes the discipline as levels of hierarchically organized concepts that begin with perceptual data at the bottom and proceeds through increasing levels of abstraction until the most abstract concept appear at the top so as to include or subsume less inclusive concept at lower stages of organization. These concepts are firmly linked to data to have a unique structural character. Like Bruner, Ausubel believes that structural concepts of each discipline can be identified and taught to the students and they then become an information processing system, which serves as an intellectual map, which can be used to analyze particular domain and solve problems within those domains of activities.

The Advance Organizer strategy operates both substantively and programmatically on the learning material. Substantively it utilizes the basic organizing concepts and principles with the widest explanatory power, inclusiveness, generality and readability of a given discipline. In this way the availability of relevant subsumers in the cognitive structure is ensured.

Ausubel emphasizes that in learning, meaningful process is essential. Material has related to established ideas in the cognitive structure of the learner in terms of ideas, which enable the material to be learned in a logically coherent way. In order to accomplish this, the learner needs access during the learning process to structure ideas that can subsume the new material to be learned and
incorporate into the cognitive structure of the learner and provide him with anchors for the new material.

Advance Organizer Model can be applied to any material, which can be organized intellectually. It can be used in nearly every subject area, although it was designed for use with verbal material rather than with skills and mastery of problem solving paradigms. However, Ausubel assumes that it will be useful in the transfer of material to new problem settings. It provides a very good discipline for lectures. It can serve very well in the analysis of expository material in textbooks and other Instructional materials where abstractions and information alternate in various patterns.

Advance Organizer Model is useful to structure extended curriculum sequences or courses and to instruct students systematically in the key ideas of a field. The model can be shaped to teach the skills of effective reception learning. Critical thinking and cognitive reorganization can be explained to learners and they can apply these techniques independently to new learning. Whenever ideas or information need to be presented renewed or clarified the Advance Organizer Model is useful.

Ausubel makes no attempt to handle the tasks, which are necessary in order to utilize Advance Organizer in inductive as well as reception learning. It seems logical that some modification would have to be made of the usual discovery procedures to accommodate the use of Advance Organizer.

Although Ausubel stresses written and verbal material and expository or didactic presentation, this need not be a hard and fast rule. Advance Organizer Model is never purely expository in the interactive situations. Children can raise their own questions. The material being organized can take the form of dialogue. It can
also be contained in a film a demonstration or stories.

To facilitate both stability and meaning, one needs to create ideational linkage between the student's own cognitive structure and that of the discipline to be taught. Ausubel uses two principles to organize curriculum and instruction: progressive differentiation and integrative reconciliation.

Progressive differentiation refers to the most general ideas of the discipline presented first followed by a gradual increase in details and specificity. When subject matter is programmed in accordance with the principle of progressive differentiation, the most general and inclusive ideas of a discipline are presented first and progressively differentiated in terms of detail and specificity. This can occur in a number of ways. One of the most common forms of progressive differentiation is the breaking down of superordinate into subordinate concepts. Another form of progressive differentiation involves the breaking of concepts into its constituent parts. And a third form is the breaking down of broader generalization into more specific ones. This type can often involve the use of examples to illustrate the generalization being discussed.

Progressive differentiation is followed both in intra and inter-unit planning. Each component unit has an organizer. In relation to each other, the units are progressively differentiated in descending order of inclusiveness so that each unit serves as an organizer for the one which follows.

Integrative reconciliation refers to the practice of interrelating or cross-referencing these units or ideas so that significant similarities and differences are recognized and real or apparent inconsistencies are reconciled. Integrative reconciliation simply means that new ideas should be consciously related to
previously learned content. The sequence of curriculum is organized so that each successive learning is carefully related to what has been presented before.

In integrative reconciliation, teacher attempts to make the logical relationship between ideas in the developing schema apparent to students. Ausubel explained the purpose of integrative reconciliation as being “to explore relationships between ideas and to point out significant similarities and differences and to reconcile real or apparent inconsistencies. Function of integrative reconciliation is to combat compartmentalization.

There are two types of integrative reconciliation - Vertical and Horizontal reconciliation. Vertical reconciliation explores relationship between more and less abstract ideas and is designed to insure that new ideas between attached to old in a hierarchical fashion. Horizontal reconciliation investigates similarities and differences between coordinate concepts and other ideas at a similar level of abstraction.

By following these two principles, the subject matter is gradually built in the mind of the learner. If the entire learning material has been conceptualized and presented according to Progressive differentiation then Integrative reconciliation follows naturally. Progressive differentiation and Integrative reconciliation increase the stability and clarity of existing ideational anchorage and ensure discriminability of the learning task.

The heart of Ausubel’s approach entails the use of Advance Organizers. Advance Organizers consist of introductory material presented ahead of learning task at a higher level of abstraction generality and inclusiveness than the learning task itself. The function of Advance Organizers is to provide ideational scaffolding
for the stable incorporation and retention of the more detailed and differentiated material that follows the learning passage as well as increase discriminability between the latter and related inferring concepts in the cognitive structure.

Advance Organizer is an idea that can provide the learner with the conceptual framework on which he can hang the new material progressively from lesson to lesson. New Organizer relates the new material to ideas that have been presented previously. As these organizers accumulate they form in the learner’s mind the information processing structure from the discipline. Thus by the end of series of units or activities the learner possesses a new set of ideas. These will serve in the mind to keep the new material distinct and clear by providing ideational scaffolding to which the new ideas are attached and which may help to remember the new material. In addition, they provide ideas to which he can relate his present cognitive structure so that the new material can be integrated with the ideas that was previously using for processing information.

The organizer is important content in itself and needs to be taught. Time must be taken to explain and develop the organizer. Usually organizer is tied closely to the material it precedes. However the organizer can be conceptually distant in order to provide a new perspective.

Advance Organizers are the result of a teacher’s conscious attempt to preview and structure the new material to be learned and to link it to content already existing in students pre-existing schemata. In a sense, Advance Organizers are like cognitive read maps, which allow seeing where they have been and where they are going. Effective Advance Organizers connect new information to
existing schemata and provide students with a means to create new schemata. They are at a higher level of abstraction than the content they organize and they subsume this information.

Ausubel describes two types of organizers and identifies their optimal applications. There are two types of organizers - Expository and Comparative. The organizers, which provide ideational anchorage, for completely unfamiliar material, are called expository organizers. This Advance Organizer strategy advocates those methods of presenting and ordering the subject matter sequence that best enhance the clarity and stability of the cognitive structure. This method follows the principle of Progressive differentiation and Integrative reconciliation. This will provide a holistic conceptual structure to which the learner can relate the new material. Expository Organizer provides a general subsumer for a new class, subclass and species before more limited subsumers are provided for the particular subclasses or species. Expository Organizers are especially helpful because they provide ideational scaffolding for unfamiliar material. The organizer in this case provides ideational anchorage in terms that are already familiar to the learner.

Comparative Organizers are used most with relatively familiar material. They are designed to integrate new concepts with basically similar concepts existing in the cognitive structure; yet they are also designed to discriminate between the old and new concepts in order to prevent confusion caused by similarity. When relatively familiar material is being presented to the learner, Ausubel recommends a comparative organizer, which will help the learner integrate new concepts with basically similar concepts in cognitive structure, which increase discriminability between new
and existing ideas, which are essentially different but confusable.

The organizer has a higher level of abstraction generality and inclusiveness of the material and is selected on the basis of its suitability for explaining integrating and inters relating the material. An Organizer is a general idea which is fairly abstract, related to the material and which precedes the material. It functions cognitively to organize the material as it is presented. It provides a kind of conceptual framework into which the learner will integrate the material.

Thus Advance Organizers are statements, which are introduced in advance of the learning material itself and are designed to help students learn and retain new material. The Advance Organizer links the new material to more abstract ideas, which already exist in the learners mind.

In a review of research, Mayer (1984) listed a number of characteristics of Advance Organizers:

1. They are typically a short set of verbal or visual information.
2. They are presented prior to learning a larger body of information.
3. They contain no specific content from the new information to be learned.
4. They provide a means of generating logical relationship in the new material.
5. They influence the learners encoding process.

The exact form that an Advance Organizer takes is dependent upon:

1. The nature of the learning material.
2. The age of the learner.
3. The degree of prior familiarity with the learning material.
The essence of strategy rests on the Advance Organizer functioning as a conceptual linkage from material to the learner. If the student never receives or perceives the organizer the strategy is lost. Advance Organizer is the primary means of strengthening cognitive structure and enhancing retention of new information. The purpose of Advance Organizer is to explain, integrate and interrelate the material in the learning task with previously learned material and also help to discriminate new material from previously learned material. The most effective organizer is that which uses concepts terms and proposition that are already familiar to the learner as well as appropriate illustrations and analogies.

In short it can be concluded that Advance Organizers are not reviewing of what was covered in the previous class, a simple overview, recalling what was done last week or last year, telling the students about tomorrow, recalling a personal experience and relating it to what will be learned or stating the objectives of the lesson. But Advance Organizers are organizational clues, tools that help to connect the known to the unknown, and frameworks for helping students understand study materials.

1. Goals of Advance Organizer Model

Ausubel’s primary concern is to help teachers convey large amount of information as meaningfully and efficiently as possible. The Advance Organizer Model is designed to strengthen student’s cognitive structures. Cognitive structure is the term used to represent a person’s knowledge of particular subject matter at any given time and how well organized, clear and stable it is. Ausubel maintains that a person’s existing cognitive structure is the foremost factor deciding whether new material will be meaningful and how well it can be acquired or retained. Before presenting new
material stability and clarity of prior knowledge should be increased. Strengthening student’s cognitive structure in this way facilitates acquisition and retention of new information and is one of the model’s primary goals.

In short, Advance Organizer Model strengthens Cognitive Structure and enhances retention of new information through Meaningful Assimilation of Information. This model helps in developing Interest in inquiry and Habit of Precise thinking.

2. Planning for Advance Organizer Model

In the planning phase the teacher has to create an Advance Organizer. In Ausubel's theory of meaningful verbal learning, an Advance Organizer is a statement preceding a lesson that is designed to preview the material to be learned and link it to content already existing in learner’s schemata. It is more general and abstract than the content to be organized and subsumes the subsequent material. This organizer should be more general, abstract, and inclusive than any of the succeeding material in the text.

In formulation and selection of Advance Organizer one needs to become very familiar with the subject area and conceptualize the discipline as a series of hierarchically organized concepts or propositions. Presentation of Advance Organizer is a distinct teaching episode apart from the usual introduction or transitions that take place in any teaching transaction.

Basically there are three types of organizers. Concept Definitions, Generalizations and Analogies.

**Concept definition:** Definition can be valuable organizers of content when the material is new or unfamiliar. Ideally, the defining statement should possess the characteristics of a good
concept definition, in that it states the concept, the super ordinate concept and characteristics of the concept. The super ordinate concept helps link the concept to existing schemata, and the characteristics differentiate the concept from the other similar ones. The preparation of the organizer requires clear thinking on the part of the teacher. It is general, abstract and inclusive but does not include totally unfamiliar language or ideas. Organizers that are too abstract or unfamiliar lose their ability to link the succeeding structure to the students existing schemata.

**Generalization:** Because of the student’s ability to summarize large amounts of information, generalizations can also be effectively used as Advance Organizers. As with the use of definitions teachers must be certain that the students when using generalizations as Advance Organizers understand each of the concepts in the generalizations. If they are not, these concepts cannot serve as anchors for the new material or link to previously learned content. Thus generalizations could be used as an organizer to subsume narrower generalizations and anchor specific information.

**Analogy:** The most effective type of the Advance Organizer is the analogy. Analogies work well because they can be customized to fit the background of a particular student population. Analogies are useful in organizing school content. The value of an analogy as an Advance Organizer depends on two factors. The first is the familiarity of the analogous element to the students. The power of analogies comes from their ability to connect new ideas with old. If the old ideas are not clear, they cannot provide any firm points for connections. The second factor is the degree of overlap between the analogy and the ideas to be taught. In all the analogies
the new material is linked to something familiar to the student and the number of possible similarities between the two concepts being compared.

3. Implementation of Advance Organizer Model

David Ausubel is unusual among the educational theorist. First he directly addresses the goal of learning subject matter. Second he advocates the improvement of presentational method of teaching. Having prepared the Advance Organizer and structured the content in the planning phase of the model, the lesson simply begins by displaying the Advance Organizer on the board or screen. The organizer serves as the lesson’s focus and the point of reference for each of the subsequent ideas.

➢ Syntax of Advance Organizer Model

Ausubel believed that learning proceeds in a top-down, or deductive manner. In a sequence of learning activities the first organizer and its material should be hierarchically more abstract than succeeding ones, which get more specific and elaborate than the original ones. The activities are designed to increase the clarity and stability of the new material so that fewer ideas are lost confused with one another or left vague. The students should operate on the material as they receive it by relating it with new learning material to personal experience and to their existing cognitive structure and by taking a critical stance towards knowledge. After that students try to gather the information, they and the teacher can ask questions to clarify ideas, add new cultural characteristics from information they found that does not fit the categories, make comparisons across groups, and apply them to new groups. Alternatively, the teacher could present information about a couple of example to develop the ideas further. In either
case, the students now have an overall picture of culture that can help them organize information about new groups as they encounter them.

Ausubel’s theory consists of three phases, presentation of an Advance Organizer, presentation of learning task or material, and strengthening the cognitive organization.

- **PHASE ONE**

Here, Clarifying the aims of lesson is one way to obtain students attention and to orient them to their learning goals both of which are necessary to facilitate meaningful learning.

Advance Organizer is an idea in itself and like learning material it should be explored intellectually. Actual Advance Organizer is built around the major concepts and propositions of a discipline or area of study. The Advance Organizer has to be constructed so that the learner can perceive it for what it is. It is at a higher level of abstraction and generality than learning material. The essential features of concept or proposition must be pointed out and carefully explained. Teacher and student should explore the organizer by citing essential features, explaining them and providing examples. It should not be lengthy, but must be clearly understood and continually related to learning material to develop integrative cognitive structure. It is especially important to prompt awareness of learner prior knowledge and experience that might be relevant to this learning task and organizer.

- **PHASE TWO**

In this phase, Lectures, Discussions, Films, Experiments or Reading may provide the learning material, which is preceded in the first phase by the Advance Organizer. Maintain students' attention and make the organization of learning material explicit to
the students so that they have an overall sense of direction.

- **PHASE THREE**

  New material in the students existing cognitive structure is anchored. Learning situation is more interactive in this phase. The successful acquisition of the material will depend on the learners desire to integrate it with prior knowledge on their critical faculty and on the teacher’s presentation and organization of the material

  Joyce and Weil summarize the basic procedure of the Syntax of Advance Organizer Model as follows

- **PHASE ONE**

  **Presentation of Advance Organizer**

  - Clarify aims of the lesson.
  - Present organizer:
    - Identify defining attributes.
    - Give examples or illustrations where appropriate.
      - Provide context.
    - Repeat.
    - Prompt awareness of learner’s relevant knowledge and experience.

- **PHASE TWO**

  **Presentation of Learning Task or Material**

  - Present material.
  - Make logical order of learning material explicit.
  - Link material to organizer.

- **PHASE THREE**

  **Strengthening Cognitive Organization**

  - Use principles of integrative reconciliation.
  - Elicit critical approach to subject matter.
  - Clarify ideas.
➤ Apply ideas actively (such as by testing them).

➤ **Principles of reaction**

The teacher or the Instructional material controls the situation. The content has been selected for the learner, and the teacher should facilitate the discussion around the material at hand. In the flow of the lesson the training agent can function to point out the conceptual anchorages for the material and help learners see the relationship between the material that is being presented and the organizer.

The teacher’s solicited or unsolicited responses to the learner’s reaction will be guided by the purpose of clarifying the meaning of the new learning material, differentiating it from and reconciling it with existing knowledge, making it personally relevant to the student and helping to promote a critical approach to knowledge. Ideally students will generate their own questions in response to their own drive for meaning.

➤ **Social system**

The social system is a structured one. The teacher is the initiator and the controller of norms. Beyond the presentations of the organizer the learning situation assume a less structured posture and teacher and students can be very interactive. The teacher retains control of the intellectual structure, however as it is necessary to continuously relate the learning material to the organizer and to help students discriminate new material and differentiate it from previous materials.

➤ **Support system**

Well-organized material is critical. The effectiveness of Advance Organizer depends on an integral relationship between the conceptual organizer and the rest of the content. The model
provides guidelines for building or reorganizing Instructional materials.

➢ Effects of Advance Organizer Model

Ausubel feels that the continuous use of inquiry-oriented strategies would be very inefficient because it would consume so much time and involve so many false steps. In addition, he feels that if learners are allowed to air their own ideas, many of those ideas will not be efficient. Therefore they will not get the power that is to be derived from the hierarchical structure of discipline. As a consequence, he feels that much learning needs to be organized as reception-learning. He presents the arguments that the reception learning can be very meaningful and should not be confused with rote learning.

The Meaningful Reception Learning- the understanding and integration of new meaning into cognitive structure is the focal point of Ausubel’s theory. Ausubel proposes supplementing meaningful reception learning with a critical approach to subject matter. Ausubel’s method elicits the learner’s active participation by requiring him to reformulate his own generalizations and integrate his knowledge in response to carefully programmed leading question. It is much more structured than discovery methods.

As far as Piaget’s theory of development is concerned, the children until ages 10 or 11 would not be able to handle the Ausubel strategy, because until those are the child is unable to reach the stage of abstract thinking which is essential to handle complex ideas.
Evaluation of effects of Advance Organizer Model

David Ausubel firmly believes in the importance of content goals. Asking the students to provide additional examples of the concept is a way for evaluating the acquisition of concepts through the model.

Asking students for recognition or verbal recall of generalization is a method of evaluating the acquisition of generalization through the model. Use of generalization to solve a problem or to predict consequences is a significant mark of the attainment of objectives at the Knowledge and Comprehension as well as Application levels.

The student’s ability to remember or recall the relationship discussed in the class is a measure at the knowledge level. An alternative way of measuring student’s knowledge of relationship is to ask them to identify, super-ordinate subordinate and coordinate relationship within the developed hierarchy.

One way of evaluating student understands of relationship at a level higher than knowledge is to ask them to apply the information learned in class to a new situation. Another method of evaluating students understanding of relationship would be to ask the students to write a description of comparison between concepts. The process skill that can be attained through Ausubel Model is that of organizing the unstructured information into a hierarchical structure. Attainment of their goal can be evaluated by testing skill in organization. This can be done by giving them with an unstructured list of familiar concepts and asking them to develop an organized diagram of the related concepts.

Ausubel gives many emphases to Instructional and Nurturant effects of Advance Organizer Model. The Instructional value
includes the idea themselves that are used as the organizer and information presented to the students. The ability to learn from reading, lectures, and other media used for presentation is another effect. Thus the Instructional effect is the conceptual structures and meaningful assimilation of information and ideas. The Nurturant effect includes interest in inquiry and precise habits of thinking.

A hierarchical classification of behaviour belonging to the Instructional and Nurturant effect will help the user to, more clearly understand the effects of Advance Organizer Model and evaluate it. The classification of Instructional and Nurturant effect of Advance Organizer Model should be in tune with the educational, logical and psychological classification system.

2.5 **Review of Previous Research Work**

The concept of schema and use of advance organizers are now considered standard educational practice. It was first introduced by the educational psychologist, David P. Ausubel, as an application of his Meaningful Learning and Schema Theory in the 1960s. Ausubel found out that the use of textual advance organizers was an efficient way to relate new concepts to students’ prior knowledge, bridging the gap between the learners’ cognitive structures and the material-to-be-learned and consequently enhancing learning and retention.

According to Ausube, an advance organizer is relevant introductory materials presented in advance. The organizers help students learn at a higher level of abstraction, generality and inclusiveness than the learning task itself. Operationally, Ausubel notes the differences between advance organizers, summaries and overviews. Advance organizers are (a) more abstract, inclusive and general than the more detailed learning materials they precede, and
(b) relatable to existing relevant ideas already present in cognitive structure. Summaries and overviews, on the other hand, largely accomplish their effect by repetition and simplification.

Since research on advance organizers had generated equivocal findings since the 1970s, some criticized that Ausubel’s definition for advance organizers was vague. Based on the results of nine experiments, Mayer made suggestions on the procedures and operationally defined steps for generating advance organizers. He interpreted advance organizers as “information that is presented prior to learning and that can be used by the learner to organize and interpret new incoming information” To facilitate learning and retention, Mayer suggests that advance organizers should:

1. Be composed of a short set of verbal or visual information.
2. Be presented prior to learning.
3. Contain no specific content from the preceding learning task.
4. Generate the logical relationships among the elements in the preceding learning task.
5. Influence the learners’ encoding process.

Synthesizing Ausubel’s ideas with more research findings in the 80s, a modified series of procedures for constructing advance organizers were suggested. The procedures for constructing textual organizers include the following steps:

1. Analyze learning materials to discover and list necessary prerequisite knowledge.
2. Map the cognitive structures of learners. Find out if students know this prerequisite material.
3. Summarize the major general ideas in the material-to-be-learned.
4. Determine characteristics of the advance organizer.
5. Write a paragraph (the advance organizer) emphasizing the major general ideas and similarities across old and new topics. Examine examples in the text. Use them as models.
6. The main subtopics of the lesson should be covered in the same sequence as they are presented in the advance organizers. Estimate the readability of the advance organizer.
7. Check the understandability of the advance organizer.
8. Assess the study time of the advance organizer.
9. Evaluate the validity of the advance organizer.
10. Revise the advance organizer.

In the current study, the advance organizers were constructed according to the 10 steps prescribed above.

❖ Studies on Advance Organizers Model

Since the 1970s, extensive research has been conducted in various disciplines on the effectiveness of both textual and graphic advance organizers on learning within the classroom setting or computer-assisted lab environment. However, the results of the research have not been conclusive, since both positive effects and negative effects have been found.

➢ Ausubel’s Model

Ausubel’s experiments provided the most-cited research supporting the effectiveness of advance organizers. Ausubel and his associates conducted five studies on expository and comparative advance organizers in a Midwestern state university and a high school in Campaign, Illinois, from 1960-63. All of the five studies reported statistically significant main effects for the organizer treatment group in the posttests, especially in the long-
term retention posttest which was conducted 10 days after the treatment.

Based on the experiments, Ausubel prescribed a model for predicting the effectiveness of advance organizers:

1. Students given advance organizers should perform better on tests on the material-to-be-learned than students in control groups.
2. The advance organizer effect should be at least as great in longer studies as in shorter ones.
3. Abstract advance organizers should be more effective than those including concrete materials or analogies.
4. Subsuming advance organizers should be more effective than others.
5. The learning of students at the formal-operational level should be enhanced more than that of concrete-operational students.
6. Advance organizers bridging the gap from previous knowledge should be more effective than overviews or summaries of the material-to-be-learned.
7. Students having either low verbal or analytic ability or low prior knowledge of the material should be helped more by advance organizers than other students. A detailed analysis of Ausubel’s studies, however, revealed a number of problems. It is claimed Mc. Eneany, that no consistent evidence was found across the studies in support of advance organizers or for predicted interactions with verbal ability. In addition, Ausubel’s definition of an advance organizer was called into question, and a sound operational definition was negotiated. Later studies in the 70s and 80s
failed to show a consistent positive facilitative effect on advance organizers. A number of findings conflicted with Ausubel’s model. In some cases, students given advance organizers before instruction did no better, or even worse, than students in control groups.

➢ **Barnes & Clawson’s Review**

Barnes and Clawson, reviewed 32 advance organizer studies using vote counting. Studies reporting statistically non-significant results prevailed 20 to 12, leading the investigators to conclude that advance organizers, as described by Ausubel, did not facilitate learning. They also differentiated among the studies according to length of study, ability, subject type, grade level, type of organizer, and learning task classification. In each comparison, the count favored non-significance. The authors recommended that further studies should be conducted using a wide variety of non-written advance organizers, provided that the organizers are operationally defined and constructed and that the studies last for more than 10 days. However, Barnes and Clawson’s review has been strongly criticized as biased against favorable findings on its unscientific voting technique and inadequate analysis and control.

➢ **Mayer’s Theory**

A) Mayer (1979) pointed out the major inadequacies with Barnes and Clawson’s review, and reinterpreted Ausubel’s subsumption theory in terms of his own assimilation encoding theory. Mayer reported a series of nine experiments supporting his contention. Based on his assimilation theory, he stipulated characteristics for constructing advance organizers as stated in the first part of this review. According to Assimilation Encoding Theory, Mayer reasoned that the failure of advance
organizers was due to the unavailability of an assimilative context in students’ long-term memory or failure to use of that anchoring knowledge during learning.

B) Mayer (1979) also reviewed advance organizer literature using 27 published studies containing an advance organizer group and a control group. He divided the studies into three categories based on three criteria: (a) is the material unfamiliar, technical or lacking a basic assimilative context? (b) Is the advance organizer likely to serve as an assimilative context? (c) Does the advance organizer group perform better than the control group on a test? Only three out of the 27 studies claimed statistical significance. However, considering the overall positive but insignificant treatment effects, Mayer concluded that there was a small but consistent advantage for the advance organizer group on tests of learning and retention. He found that advance organizers had a stronger positive effect if learners lacked prerequisite skills or knowledge, if the learning material was poorly organized, or if generalized outcomes were measured.

➢ Luiten, Ames, & Ackerson’s Meta-Analysis

Two other literature reviews use Glass’s meta-analytic technique—effect size statistic—to compare and synthesize studies on advance organizers. In 1980, Luiten, Ames, and Ackerson examined 135 studies that showed the effects of advance organizers on classroom learning and retention. They found advance organizers to have a positive measurable effect on immediate learning (posttest within 24 hours of the treatment) and long-term knowledge retention (posttest 24 hours and after). The mean effect size for the advance organizer on learning was 0.21,
indicating that the average participant performed better than 58% of the control group individuals. Table 1 reports the means and standard errors or effect sizes for advance organizers on learning and retention of the studies. One of the most interesting findings from this meta-analysis is that the retention data showed the advance organizer effect increased with time. The mean effect size on retention 24 hours and after was 0.26 and that of 22 days and longer was 0.38, considerably higher than effect size on immediate learning at 0.21. Other variables such as grade level, subject area studies, organizer presentation mode, and subject ability level were also examined. Contradictory to Ausubel’s model, the data indicated that advance organizers were effective with individuals of all ability levels at all grade levels. Although studies involving other media of advance organizers are few in number, the effect size of studies on oral advance organizers is much higher than studies using only a written presentation mode for the advance organizers.

Stone’s Meta-Analysis

In another meta-analysis, Stone (1983) analyzed 29 long-term studies of advance organizers in which post tests were administered one week or later after the treatment and compared her results with predictions from Ausubel’s theory of meaningful learning. The results confirmed that advance organizer groups performed better than control groups. However, the effects of other variables, such as ability level or grade level, were not supported. Stone’s meta-analysis produced a mean effect size for all studies of 0.66 between experimental and control groups, associating advance organizers with increased learning and retention of new and unfamiliar materials. Stone also differentiated effect sizes by
organizer characteristics, learner characteristics and learning condition.

➢ Corkill’s Studies

Corkill and his associates conducted two studies on advance organizers in 1988. One study consisted of six experiments to investigate retrieval context set theory. With an average effect size of 2.24, the results indicated that rereading true advance organizers before delayed recall significantly facilitated memory performance. The other study by Corkill compared the effects of concrete and abstract advance organizers on students’ recall of prose, however, generated quite inconsistent results. It was expected that both organizers would facilitate learning and retention, but the results showed that only the concrete organizer treatments had a positive mean effect size of 2.25, while the abstract organizer treatments produced a mean negative effect size of -0.62.

➢ Kenny’s Review

Another major literature review pertaining to advance organizers was conducted by Richard Kenny in 1993. The review examined a series of studies associated with both textual and graphic advance organizers on learning and retention, as well as relevant research with computer-based instruction (CBI) (Kenny, 1993). Table 4 illustrates the effect sizes for advance organizers on learning and retention, as reported by Kenny (1993). Effect sizes for the studies on textual organizers ranged from -1.02 to 2.04 for measures of learning and from -0.18 to 4.08 for tests of retention. For graphic organizers, effect sizes ranged from -0.64 to 3.95 on learning, and from -0.95 to 1.76 on retention. Kenny concluded that the evidence of advance organizer effectiveness was mostly positive, though sometimes inconsistent.
Mathew (1997)

Mathew tried to compare the efficacy of AOM with CM of teaching mathematics at secondary school level. The AOM was more effective in terms of student achievement.

Preetha (1990)

Preetha conducted a study to examine the effectiveness of advance organizer model and ITM in the teaching of Mathematics in Std. VIII. The result showed that the attainment of pupils taught using AOM was not differing significantly from those taught using ITM. But the attainment in Mathematics of pupils taught using AOM was significantly higher than those taught using TM with respect to the objectives namely knowledge, understanding, application and evaluation.

Pande, B (1986)

Pande compared the effectiveness of AO and set induction in learning the major objective of the study were to determine the effect of AO and set induction on achievement. The findings of the study revealed that there is no significant influence of interaction between method of instructional criterion test and sex criterion test.

Bhalwankar (1985)

Bhalwankar made a study on the effect of expository and guided discovery method of teaching on achievement in mathematics of students of different levels of intelligence. The major findings of the study were that the guided discovery and expository method were equally effective on knowledge and comprehension objective with respect to immediate test and retention test. The expository method was found to be more effective than the guided discovery method on application objective with respect to students of high intelligence.
Kerston (1976)

Kerston examined the effect of an AO on the learning and retention of learning materials. It was found that there was no significant difference between AO group and control group.

Smith C.D. (1976)

Smith studied the effect of AO and Abstract reasoning levels on learning and retention of post secondary mathematics students. AO was found to have more effects on long range retention.

Graber (1975)

Graber examined the use of AO and questioning. As a method of testing, pretest - posttest experimental design was employed for the study. The findings of the study indicated that no organizer was superior to the other and there was no significant advantage over the level of questioning.

Caponechi (1973)

Caponechi conducted a study on 91 undergraduate students and examined the effect of an advance organizer as compared to an introductory overview and a control set of historical materials on the acquisition and retention of the topic of matrices within a normal class room situation. The findings showed that there were a significant interaction between the treatment and ability level on achievement test; and no statistical difference between the organizer and introductory overview means, although the difference in the means favored the advance organizer.

Nixt (1972)

Nixt conducted a study on students enrolled in freeman mathematics course to examine the relative effects of frequent use of advance organizer and structures review in a college mathematics course for students who are not physical science
engineering or mathematics majors. The result of the study showed that there was no significant difference for treatment effects, recitation instructor effects not interaction.

- **Veena (1998),**

  In her study tries to explore the relationship of mathematics learning with different temperamental variables and found that IQ and reasoning are significantly related to the dimensions of ascendant, responsible, critical and plentiful.

- **Kasant, (1991),**

  Kasant attempts to identify the cause of the large failure in mathematics at SSC examination of Marati medium high school students in Palghar tahsil found that low intelligence is one of the factor for the cause of large failures among boys and girls along with poor numerical ability, poor comprehensions and poor study habits

- **Sarala (1990)**

  Sarala surveyed the conceptual errors of secondary school pupils in learning select areas in modern mathematics and found that the number of conceptual errors is very high and it is influenced by intelligence along with some other variable namely sex, study habit etc. The relationship between errors in mathematics and intelligence was seen to be negative and significant.

- **Deshmukh Veena (1988)**

  Veena in a study tries to explore the relationship of mathematics learning with different temperamental variables and found IQ and reasoning were significantly related to it.
Setia S. (1992)

Setia in a study addresses to the theoretical understanding of the achievement of learner at the senior secondary level in Modern Mathematics in relation to the socio psychological educational factor and found that there was a significant difference in the achievement of rapid learners on different levels of intelligence.

Kasant B.S. (1991)

Kasant in an in-depth study of the causes of the large failures in Mathematics at SSC examination of Marati Medium High School Students points out intelligence is a major factor for the cause of failure along with other variables like poor numerical ability, poor comprehension and recall ability, no interest in Mathematics and poor study habits.

Shankara Narayanan B.L (1990)

Shankara in a study addresses the problem of achievement in Mathematics under guided discovery learning and reception learning condition in relation to intelligence and anxiety and found that students of high intelligence performed better than the average intelligent students irrespective of the method of instruction employed on the criterion measures Researchers continue to search for the interventions that will increase IQ and, ultimately, academic achievement. Intelligence and creativity are the two main cognitive variables studied by a large number of researchers. Corroborative evidence to prove that intelligence is a correlate of achievement was obtained by Garg L., 1992; Kaur P., 1992; Sen Barat K., 1992; Chanda N.K. and Chanda S., 1990; Devi U.A., 1990; Shah J.H. 1990; Thilagavathi T., 1990; Kumar R. 1989; Bhusari C.V., 1988 and Kaile H.S., 1988. They found that the conjoint effect of
intelligence and creativity is different on achievement in different subjects.


  Desai conducted a study entitled “A study of effectiveness of Advance Organizer Model and Traditional Method in teaching of Physics at senior secondary level” and reported that students took active interest in reading and learning through Advance Organizer Model. It was found that the pupils’ scoring high on the Intelligence test also scoring high in the post-test and pre-test and those having low score on the Intelligence test score low on the post test. The result was quite consistent with the concept of Intelligence and Achievement.

- **Nagappa, A. (2004)**

  Nagappa has titled “Effectiveness of Inquiry Training Model (ITM) and Biological Science Inquiry Model (BSIM) on Scientific Aptitude and Achievement in Biological Science of Saink School Students” and concluded that Biological Science Inquiry Model and Inquiry Training Model are more effective than Traditional Method of Teaching Biology. Inquiry Training Model is significantly more effective than Biological Science Inquiry Model in terms of CBSE scores. Inquiry training model is significantly more effective than conventional teaching method in terms of mental Ability test score.


  Rao conducted a broad study on the topic “Effectiveness of Biological Science Inquiry Model and Traditional Method on scientific aptitude and achievements in Biological science of smile school students” and reported that Biological Science Inquiry Model was found effective than Traditional Method in the
view of Scientific Aptitude and Achievements of smile school’s students.

➢ Saxena, S. (2005)

Saxena Studied on “Effectiveness of Inquiry Training Model & Biological Science Inquiry Model over Traditional Method for teaching Biology”, She reported, on the basis of pre-test & post-test score of achievement, that Inquiry Training Model (ITM) & Biological Science Inquiry Model (BSIM) is more effective than Traditional Method (TM).


Singh compared “Relative Efficacy of Advance Organizer Model and Inductive Thinking Model of teaching in Economics”. He concluded that there was significant gain in the achievement test scores in Economics of class eleven students who were taught Economics through Advance Organizer Model (AOM) of teaching. As far as the Inductive Thinking Model was concerned, there was a significant gain in the pre-test, post-test mean scores of achievement in Economics of class eleven students. It could, thus, be concluded that ITM was an effective strategy of teaching for enhancing the achievement of students in Economics. The attitude scores of the sampled students also registered a significant increase when the Advance Organizer Model of teaching was used. There was a significant gain in the attitude scores of class eleven students when they were taught Economics through ITM.

➢ Raghav, R.P.S. (2009)

Raghav RPS organized an experimental Research entitled “A Comparative Study of Effectiveness of Programmed Instruction and Traditional Methods in Teaching Biology” and
concluded that Methods of Teaching, Intelligence, Socio-Economic Status and Delayed Intervals had a significant effect on the Academic Achievement in Biology. Programmed Instruction Method (PI) exhibited more scholastic achievement than the Traditional Method (TM) of teaching. The students of High Intelligence group showed more scholastic achievement than those of Low Intelligence group. The progressions in the level of SES of students demonstrate increase in the scholastic achievement. The scholastic achievement scores were observed to have a decreasing trend from next day testing to final testing.

➤ **Upadhyaya, A (2011)**

Upadhyaya conducted an experimental research entitled “Effectiveness of Concept Attainment Model and Inquiry Training Model on Scientific Aptitude and Achievement in Science of Secondary School Students” and concluded that CAI & ITM both are effective in comparisons to Traditional Method in reference to achievement and scientific aptitude.

➤ **Shailendra M. Vaghela (1997)**

Shailendra conducted "A comparative study of teaching Economics through programmed instruction method & lecture method." from Gujarat University. The main objective is compare effect of lecture method with students' educational achievement. For this study researcher used Self made programmed instruction on Money & Banking of Economics of Std-XI. (Pre behavioural & objective behavioural tests) and researcher used ANOVA & ANCOVA method. The findings are as under: 1. The teaching through programmed instruction was in no way inferior to lecture method. 2. The mean difference of programmed instruction was in favour of first unit. 3. There was a significant effect of experiment
when sex was ignored. 4. Lecture method was superior to programmed learning method in case of second unit. 5. There was a significant difference at 0.05 levels among the eight groups formed by using 2×2×2 factorial design.

➢ Rawat Jayshree B. (1997)

Titled "A comparative study of the effect on Educational achievement of pupils of Grade - VIII in some science units by teaching through Lecture method & Demonstration method." from Gujarat University. Objective are, 1. To find out the effect of lecture method on educational achievement sex wise & unit wise. 2. To find out the effect of Demonstration method on educational achievement sex wise & unit wise. 3. To find out effect of sex & teaching methods on science achievement of students of std-VIII. 4. To compare the effects of both teaching methods on bright & weak students. Researcher used Scores of first test were treated as pre-test & for the post test a self made achievement test was administered as tool. Method of analysis is Chi-Square test was carried out for testing homogeneity of the groups and 2×2×2 factorial design was selected & multiway ANOVA was employed. The finding of the study is, 1. There was a significant effect of the first unit on Experimental group & controlled group. It was in favour of girls. But when sex was combined, there was no significant effect. 2. There was significant mean difference between post-test scores of two methods. 3. There was a significant effect of sex on students’ educational achievement in favour of girls. 4. There was no significant effect of unit on students’ educational achievement. 5. There was no significant two ways interaction effect between method based on sex & unit.
Kaushal Desai (1996)

Kaushal Desai study "An Investigation in to the effectiveness of Assignment Method & Demonstration Method in teaching science to the pupils of Std-VIII in context of their I.Q. level." from Gujarat University. The tool of the study is K.G. Desai I.Q. test was used to find out I.Q. level of students & a self made test was used as post test. Methods of Analysis are the investigator used $2 \times 2 \times 2$ factorial design for data analysis. ANOVA was used. New man keuls sequential range test (2) was employed for determining the significant difference between pairs of means of different I.Q. levels. Findings are following, 1. Mean achievement of students belonging to HIQ, MIQ & LIQ group differed significantly. It was in favour of HIQ group. 2. Mean achievement of students of demonstration group was significantly different from that of assignment group. It was in favour of assignment group. 3. Mean achievement of boys & girls differed significantly & it was in favour of boys. 4. There was a significant interaction effect of teaching methods & intelligence on the achievement of students. Assignment method has a very positive effect on HIQ where as it had no significant effect on the achievement of MIQ & LIQ groups. 5. There was a significant effect of sex & intelligence on achievement of students.

Bhavna M. Prajapati (1996)

"A comparative study of the effect on Educational achievement of pupils of Std- VIII in some science units by teaching through lecture method & Demonstration method." Gujarat University. Researcher used Teacher made achievement test was used as post test as tool. Methods of Analysis ANOVA. Findings: 1. There was a significant effect of experiment on the students of both schools in
case of both units. It was in favour of experimental group. 2. There was no significant difference between the score of students of both the schools.

➢ **Maheshbhai Thaker (1993)**

Title: Investigation in to effectiveness of linear programmed material and branching programmed material in the subject of economics for Std- XI in relation to certain variables from Gujarat University Objective: 1. To plan linear & branching programmed material for 2 units of economics of Std-XI. 2. To prepare an achievement test & standardise it. 3. To compare the effectiveness of linear & branching programmed material. 4. To compare the achievement of students having high & low reading ability. Tools: Linear & Branch programmed material based on ‘ Demand’ & ‘Supply’ form the text book of Economics of Std-XI Methods of Analysis: Mean, Standard Deviation & Quartile deviation, ANOVA, ANCOVA Findings: 1. Achievement of students learning through linear programmed material was high. 2. Achievement of students learning through branching programmed material was higher than of conventional approach. 3. Students could progress by self learning method & their achievement was high.

➢ **Desai K.V. (1985)**

Title: An investigation into the efficiency of different instructional media in the teaching of science to the pupils of class VIII in relation to certain variables from Sardar Patel University. Objective: 1. To compare the achievement of pupils in science, learning through different instructional media & traditional way of teaching. 2. To compare the achievement of pupils learning through the programmed learning approach & the traditional way
of learning. 3. To compare the achievement of pupils learning through the experimental approach & traditional way. Tools: 1. Criterion test was prepared for the units selected. Junior index of motivation scale reasoning ability test was used to measure motivation towards school & reasoning ability of the pupils. Methods of Analysis: ANOVA was used to test various hypothesis. Findings: 1. Programmed learning method was more effective than traditional way of teaching. 2. The slide with discussion approach was more effective than traditional way of teaching. 3. The experimental approach of teaching was more effective than traditional way of teaching. 4. In the teaching of science, the experimental approach was the most effective of all the approaches.


Title : A Comparative study of Teaching Mathematics by the method of Programmed Instruction & Conventional classroom method from Aligarh Muslim University. Objective: 1. To compare the outcomes of teaching maths through Programmed instruction & Conventional methods of teaching. 2. To find out whether intelligence, information, rigidity, study habits & previous achievement of students were differentially related to their achievement & retention when they learn mathematics through a foresaid two methods. Tools: Self made achievement test was used as post test. Findings: 1. Programmed instruction method was more effective than the conventional method. 2. The personality dimension Introversion - extraversion had highly significant effect on achievement. 3. Intelligence had a significant effect on achievement.
Kumar Ashvin (1981)

Title: An Experimental study of the relative effectiveness of three methods of instruction-Exposition method, Programmed learning method & Multi-media method in science education from Kurukshetra University

Objective: 1. To find out the relative effectiveness of the three methods mentioned above. 2. To study the relative relation in learning through above mentioned three methods. 3. To develop a programme in Branching style on the selected unit of Biology. 4. To develop multimedia text on the programmed content.

Tools: Teacher made criterion test was used to obtain pre test-post test scores.

Findings: 1. The Multi-media method was more effective than other two methods. 2. Programmed learning method was more effective than expository method. 3. Retention in learning through Multi-media method was higher than the other two methods. 4. There was no interaction among the three methods of instruction & levels of I.Q.

2.6 Summary of the Previous Related Researches


1. AOM is very useful in mathematics teaching.

2. Discovery method is very useful with respect to students high intelligence.
3. AOM is favorable in teaching method.
4. IQ and Reasoning were significantly related.
5. Significance difference found on the achievement of different levels of intelligence.
6. High Intelligent students got high score in post test.
7. Significant gain in the attitude score in class 11th students when they were taught through ITM.

Panda (1986) found that there is no significant influence of interaction between method of instructional test and criterion test.

Kerston (1976) found that there was no significance difference between control group and experiment group.

Nixt (1972) found that there was no significant difference for treatment effects recitation instructor effect on interaction

2.7 Significance of the present study

The review of related literature shows that an experimental and new innovative method is superior to traditional or conventional classroom methods. They bear more fruit than the other methods. Such methods increase the educational achievement of students. In most of the cases an experimental methods had a very positive and significant effect. An investigator had found that many researches are done by different types of teaching methods in Educational Technology such as by Demonstration method, Programmed Instruction method, Classroom Method, Assignment method, Lecture method and by Multi-media in our country and abroad.

So, in the present study, an investigator has undertaken a Effectiveness of AOM in teaching of Science and Technology among secondary school students in context to their intelligence.
Researcher herself is a science teacher so this attempt was made by her. This is first kind of attempt and researcher selected one rural area school and one urban area school for her research work.
References


