Chapter - I
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INTRODUCTION

Despite great advances in knowledge about, students' learning and tremendous amounts of investments involved in terms of time, effort, and money, our schools today still have not progressed towards the goal of efficient learning for all the students. Usually, students left alone on their own often make very little progress in learning. Students fail so often and so universally that some people are convinced that failure is an essential and inevitable aspect in the education sector (Torshen, 1977). Failure however often produces harmful consequences that work against the goals of education and many students, who receive repeated and consistent evidences that their work was unsatisfactory, have been convinced that school was a place where they could not succeed. When sincere attempts to teach and to learn meet with repeated negative responses, the instructional process can actually eliminate activities that are essential to productive education.

However, if students are to earn positive evaluations and at the same time experience success in the classroom, they must demonstrate competent academic performance, including mastery of educational tasks (Torshen, 1977). But, when students fail to demonstrate performance that is competent and is recognized as such, they fail to produce work that is worth of reward.

In mastery learning situations, the acquisition of the subject-matter involves a chain of learning in a way that no single link could be broken out without all subsequent links being lost. Each student needs access to instruction appropriate for his own level if he is to obtain a maximum benefit from the time he spends in school where instruction in basic skills and knowledge continues until he has developed adequate competence. Competence involves human performance in intellectual, affective (social and emotional), and physical areas. These abilities influence performance in each of the six domains of competence which encompasses a variety of types of learning (Torshen, 1977). These are intellectual, emotional, physical, aesthetic and, spiritual types of learning.

Educational processes must be specifically designed to teach each of various categories of learning in each domain if the student’s potential for learning is to be developed. Whenever the student does produce good work, he needs to receive some evidence that his performance is good. Such evidence is
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A benchmark indicator to the student, to his teachers, parents, and to his classmates and peers that he is capable of performing well in school. Receiving positive evaluations for good work encourages students to:

- Develop self-confidence,
- Be realistic and positive in his thinking by encouraging him to develop positive expectations concerning his future performance, reinforce the efforts the student puts forth to produce the academic work and,
- Motivate the student to continue these efforts.

On the other hand, the student who does not earn positive evaluation for his academic ability may lack evidence that he can perform well in academic areas. When his efforts to perform well and the work he produces do not earn favourable evaluations, he may not remain motivated to continue trying to do well in academic tasks. Initially, most students want to do well in school (Entwisle, 1973). But, the student who has experienced consistent failure in the classroom tends to lower his own expectations concerning school success, directs his energy outside the classroom to athletics or youth gangs or to other areas where he can experience the satisfaction of success, and rationalize that the school is not important to him because he believes it is impossible for him to succeed there (Lewis, 1974).

If a student is to continue to expect to do well in school, he needs to receive some positive evaluation for his academic performance. If an individual is to develop a positive concept of himself, as a student, he needs to perform completely and to receive evaluations that he interprets to be positive within his own framework of reference (Torshen, 1969; 1977). When the student is perceived as a less than competent learner, forces are set in motion that reduce the chances that his potential will be developed to its fullest extent in school. The other students and his teachers may come to view him as having less potential than he really is. The academic goals he sets for himself and those that are set for him by his well-intentioned teachers may not sufficiently challenge his true abilities (Brophy, and Good, 1974). A student may therefore try to:

- Direct his own personal resources to non-academic areas because he believes that success in academic subjects is not open to him,
- Decide not to apply his maximum efforts to learning school subjects,
may fail to acquire some of the skills and knowledge he needs as a basis for further learning,

adopt the opinion that school tasks in general, and test taking in particular, may generate feelings of fear and anxiety that are additional stumbling blocks in his learning process.

During the time when he is in school, a student needs to attain mastery of essential learning tasks (Erikson, 1959). So that he can see himself as a competent student and to receive evaluation that indicates to him and to those important to him that his performance has been successful (White, 1960; Skinner, 1968; Kelly, 1971). If he fails to attain mastery or to achieve the status of one who is competent and successful, his chances for healthy development can be substantially reduced (Torshen, 1977). Yet, teachers often give a homogeneous set of achievement standards which all students are expected to master at the same time.

Individual differences are usually accounted for by ranking the students who can earn most or all of what is expected of them to receive high ranks, and students who do not, receive low ranks. During their educational careers, students differ almost in every class, in their goals, aptitude prior to entering school, experiences both in and out of the classroom, in the speed with which they learn, in the educational methods that efficiently and effectively produce mastery and in the way they use their time devoted to learning.

The teacher, faced with the job of creating an enabling environment in which each student can develop his potential and attain competence, is confronted with a monumental task. This task may be impossible unless the teacher can employ the varied instructional methods and materials sufficiently appropriate for each student to enable him to master the basics of the curriculum (Erikson, 1959; White, 1960; Kelly, 1971; Torshen, 1977; Wang Feng, 1999).

Each student needs access to instruction at the level appropriate to him. Flexible scheduling is needed to allocate the amount of time each student needs to attain mastery (Torshen, 1977). Students with diverse interests and goals need instructional objectives appropriate for them. Though these conditions appear reasonable, they are lacking in many classrooms at the present time. Students in any class often learn at different rates. Some may have learned the pre-requisites needed to succeed in the course, while others may have failed to
learn some basic skills. Students may also differ in the extent to which they can understand and benefit from one form of instruction. When all the students in the class are given appropriately the same instruction and approximately the same time to learn, their level of achievement attained upon completion of the course often varies extensively (Carroll, 1963a, 1973).

Today's schools face the enormous task of producing students with the basic capabilities they will require to meet the diverse responsibilities in an extremely complex world. As capacities for storage of information and for communication have increased, there have been corresponding increases in the amount of information available to the average citizen.

Skills in reading, comprehension, reasoning, analysis, problem solving, and above all, responding constructively to changes are needed to deal intelligently with this vast amount of information. Reasonably, a student expects that the success in his future job will be dependent upon skills and knowledge he acquires in school.

The success of any competency based education programme is dependent upon the student's success in attaining the level of performance that are essential to competence (Torshen, 1977; Wang Feng, 1999). Mastery, the attainment of adequate levels of performance, is the goal of academic achievement in the education sector.

MASTERY LEARNING

Mastery learning (Bloom, 1968), offers a powerful new approach to learning which can provide almost all students with successful and rewarding learning experiences now available to only a few.

The Mastery Learning Model was introduced into the professional literature in the late 1960's (Bloom, 1968). Since that time, a great deal has been learned about mastery learning: what it is and is not, how it works and how well it works (Block, and Anderson, 1975).

A fundamental change in thinking about the nature of instruction was initiated in 1963 when John B. Carroll (1963a) argued for the idea of mastery learning. Mastery learning suggests that the focus of instruction should be the time required for different students to learn the same material. This contrasts with the Classical Models (based upon the theories of intelligence) in which all
students are given the same amount of time to learn and the focus is on differences in ability.

The idea of mastery learning amounts to a radical shift in responsibilities for teachers. The blame for a student's failure rests with the instruction not lack of ability on the part of the student (Levine, 1985). In a mastery learning environment, the challenge becomes providing enough time and employing instructional strategies so that all students can achieve the same level of learning (Levine, 1985, Bloom, 1981). The student's success in attaining the levels of performance that are essential for competence depends upon the success of any competency-based education programme (Torshen, 1977).

Mastery is therefore the name given to a model used to structure curriculum (Torshen, 1977). This structure is designed to maximize the likelihood that each student will reach the performance levels essential for competence (Torshen, 1977). Mastery Learning has been widely applied in schools and training settings. Various researches have shown that Mastery Learning if well planned and conducted, can improve instructional effectiveness (Slavine, 1987; Block, Efthim, and Burns, 1989). At the same time, there are some theoretical and practical weaknesses including the fact that people differ in ability and tend to reach different levels of achievements at different times (Cox, and Drunn, 1979). Further more, Mastery Learning programmes tend to require considerable amounts of time and effort to implement which most teachers and schools are not prepared to expend. The Criterion Referenced Instruction (CRI) Model of Mager is an attempt to implement the Mastery Learning Model. In addition, the theoretical framework of B.F.Skinner, (1954; 1968) with its emphasis on individualized learning and the importance of feedback (reinforcement) is also relevant to mastery learning.

Mastery is also a logical process that:

- begins with defining the learning outcomes it intends to produce. This is followed by the instructional and assessment procedures designed to maximize the likelihood that each student will arrive at the desired learning outcomes, thus;
- structure educational programmes designed to help most students in a group to attain specific levels of performance,
provides a format for structuring instructional programmes, which enables those who are concerned with the educational process to participate actively in determining its direction. The format also provides a structure for continuous planning and progress where educational resources can be more appropriately allocated when diagnostic evaluations have identified students' strengths and weaknesses as well as their needs, goals and interests,

is flexible enough to be applied in open, informal classrooms and in self-contained formal classrooms, as well as in classrooms that fall between these two extremes,

its components provide tools for identifying what it means to do a good job for monitoring the instructional progress to determine whether it is doing a job and also reform weaknesses in the educational programmes,

the procedures of mastery learning also help educators and students to identify specifically what they are learning in an educational programme, and

its components provide tools for recognizing each student's progress.

When a student faces challenging academic tasks, and if one goal is impossible to attain, or otherwise, non-productive, a more appropriate goal can be selected and if one road leads to a dead end, the student can blaze a new trail (Slavin, 1987). Thus, in mastery learning situations, there is always a will and hope (Slavin, 1987). Hence, the need for mastery learning becomes increasingly important day by day.

**ORIGIN OF MASTERY MODEL**

Two widely read and respected educators, J.Franklin Bobbitt and W.W. Charters, presented some of the concepts basic to the mastery model in the early twentieth century.

- two of Bobbitt's books. *The Curriculum (1918)* and *How to make a Curriculum (1924)*, spelled out how to identify the major curriculum objectives and to plan appropriate learning activities.
- in *Curriculum Construction (1923)*, Charter also focused on the use of objectives in designing a curriculum. In addition, Charter described what
he called analysis of activities. *This analysis was conducted for the purpose of selecting the most appropriate activities for teaching the objectives and organizing the activities into hierarchical sequences.* The activity analysis has received considerable attention in the various taxonomies of educational objectives (Bloom, *et al.*, 1956), and in the writings of task analysis (Gagné and Briggs, 1974).

In the 1920s, instructional programmes based on mastery principles were implemented. In the Winnetka Plan, (Wasburne, 1922), the curriculum objectives were recorded on student’s report cards called goal cards. To date, the Winnetka goal cards still appear in texts on educational evaluation (Gronlund, 1974).

A second implementation occurred at the University of Chicago’s Laboratory School (Morrison, 1926). Bobbitt published his final book *The Curriculum of Modern Education* in 1941. In his last major work, Bobbitt acrimoniously criticized the very curriculum making, he had advocated in his book *How to make a Curriculum* (Bobbit, 1924). Bobbitt stated, curriculum making belongs to the Dodo and the Great Auk (Bobbit, 1941). Bobbitt was reacting against the widespread implementation of his earlier recommendations in the highly structured, regimented curriculum in which all the students perform the same activities at the same time. If the planned curriculum produced instruction that omitted individual discovery and prevented the curriculum from being adapted to individual student’s needs, Bobbitt wanted none of it and emphasized the importance of students’ mastering basic skills, such as spelling and handwriting. He stressed that instructions designed to promote such mastery should be adapted to the individual students’ developmental levels and should continue into high school and Junior Colleges if necessary. Bobbitt stated that all instructions must be adapted to the needs and interests of the individual students. The mastery structure is most appropriate for those segments of the curriculum designed to teach the core of basic skills, concepts, facts and attitudes. The amount of instructional time and resources which the mastery aspects of the curriculum need will vary according to the proportion of the curriculum devoted to the basics and to the amount of time the students require to master the basics.
In 1950, Tylor re-emphasized the position that a curriculum should be organized around educational objectives. Much of the current interest in the mastery structure was rekindled by the theoretical Model of School Learning presented by John Carroll, (1963). Carroll’s Model for School Learning outlined major factors influencing the students’ success in academic learning.

One major contribution of this Model is the proposition that most students can learn much of what is taught in the regular school curriculum if sufficient time is allotted. Carroll defined the students’ aptitude for learning as the amount of instructional time he needs in order to attain mastery. The original statement of the Carroll’s Model (1963a) proposed the following:

- Mastery Learning
- and Degree of Learning
- and Time Actually spent to learn
- and Time needed to learn
- So that
- Degree of Learning

\[
\text{Degree of Learning} = \frac{\text{Time allowed to learn} + \text{Perseverance}}{\text{Aptitude} + \text{Quality of Instruction} \text{ and Ability to understand instruction}}
\]

This structure is the concept of Mastery Learning (Carroll, 1963a; Hilgard, 1986).

Carroll’s Model of School Learning (Carroll, 1967) received a great upthrust from Bloom, (1981). Bloom’s Model using group instructional techniques, varies both in instruction and time to test individual needs. The key elements in Mastery Learning are:

- clearly specify what is to be learned and how it will be learned,
- allow the students to learn at their own pace,
- assess students’ progress and provide appropriate feedback or remedial work, and,
- test whether the final learning criterion has been achieved or not (Learning outcomes).
Based on Carroll's Model, (1971), the following procedures were suggested to be adopted for teaching using Mastery Learning Approach (Scriven, 1967; Melvin, 1970):

- go through a unit of study and pick out the most important content points that you wish to stress upon for they are likely to have a value basic and necessary for later learning,
- list these points in the form of goal cards, instructional objectives, and arrange the objectives in an organized frame,
- distribute a list of objectives at the beginning of the unit and inform the students to concentrate on learning them and that they will be tested on them,
- consider the possibility of making some study guides in which you can provide specific questions relating to the objectives and a format for students to use to organize their notes,
- make up examination questions on the objectives, based on the study guide questions,
- arrange the questions into at least two or three alternate examinations for each unit of study,
- make up tentative criterion for guidance levels for each examination and for the entire unit i.e.
  - not more than one question missed on any examination;
  - not more than two questions missed on any examination;
  - not more than four questions missed on any examination.
- test students either when they come to you and indicate they are ready or when you feel there has been ample opportunity for all students to have learned materials,
- announce all examination dates in advance and remind students that the questions will be based only on the objectives they have been given earlier,
- indicate the criterion for different grade levels and emphasize that any student who fails to meet a desired grade criterion on his first trial will be given a chance to take an alternative form of the examination,
- grade and revise the examination as promptly as possible,
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- go over the questions briefly in class for those having difficulty and offer to go over the entire examination on an individual basis,
- schedule or make up examination time table and make yourself available for consultations and for tutoring the day before,
- if students improve their scores on the second examination but still fall below the desired criterion, consider a safety valve option by inviting them to provide you with a filled in study guide when they take examinations the second time or give them an open book on the objectives they missed to see whether they can explain them other than in written examination terms,
- give credits for extra answers on the second examination,
- sign all books and report papers of students and grade all the reports and supply constructive criticisms where applicable and,
- have the reports out for final grades.

However, attention should be paid to evaluation that forms part of the teaching/learning process and provides continuous feedback to improve learning and instruction (Torshen, 1969; Melvin, 1970; Torshen, 1973). Thus, tests should be used to form learning by helping to diagnose weaknesses, and making remedial instructions easier (Melvin, 1970). Mastery learning therefore reduces competition and comparisons, but it does not eliminate them. Students who learn easily will meet the criterion for A Grade with little effort. They are likely to go through the required sequence so rapidly that they have considerable time for independent study. At the same time, those students who learn slowly will engage in a constant battle to keep up with the required work. Because capable students learn faster, and can engage in more self-selected study, they will probably get further and further ahead of their less capable classmates (Melvin, 1970).

Mastery approach cannot by itself alter the fact that students who learn easily and rapidly are still likely to be rewarded. A mastery approach is therefore well worth the extra time, effort, and trouble it requires. Thus, instructional programmes should be designed to permit variations in amounts of instructional time available to students.
Bloom (1971) presented an additional Model for School Learning (Bloom, 1971; 1976) which proposed that the amount a student learns is a direct result of the amount of time he actually spends in learning. The amount of time a student spends in learning is influenced by the quality of a given learning environment. This in turn, is influenced by the student’s cognitive entry behaviours (such as his aptitude and preparation for this particular task) and his effective entry characteristics (such as his attitude towards and interests in the task).

Bloom accepted Carroll’s proposition that most students can attain mastery of basic skills if they are given sufficient learning time and if the instruction is of sufficiently high quality that they understand and profit from it. Research conducted by Carroll (1973) indicated that measures of students’ aptitude for a particular subject were reliable predictors of their performance at the end of an instructional programme in that subject when all students in a group were allowed the same amount of time to learn. However, if the instruction and the time allowed for learning were varied to meet the individual student’s needs, most students attained mastery.

Torshen (1977) incorporated two models presented by Carroll (1963a; 1971) and Bloom (1971a) into the theoretical school performance as shown in fig.1.0 below.
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Fig. 1.0

School Performance Model (Torshen, 1977)

STUDENT
- Attitudes:
  - Intellectual
  - Affective
  - Physical
  - Prior learning
  - Experience

INSTRUCTION
- Methods
- Materials
- Teachers
- Other instructors
- Peers
- Environment
- Services

STUDENT
- Ability to Benefit From instruction
- Learning Rate
  - Attentiveness
  - Persistence
  - Expectations
  - Self-Confidence

INSTRUCTION
- Quality of instruction
- Possibility of learning
- Time Allowed for Learning
- Environmental and intrapersonal distractions

TIME NEEDED TO LEARN

TIME SPENT ON ACTIVE LEARNING

LEVEL OF PERFORMANCE
(AMOUNT LEARNED)

Other Influences

StUDENT
- Entry to next segment of instruction

INSTRUCTION
- Diagnosis and Remediation
- Other Influences

Other Influences
This school performance model proposes that a student will attain a specific level of performance when the following conditions are met:

- the student has adequate intellectual, affective and physical aptitude;
- his prior learning and correct experiences, both in and outside the classroom have given him adequate preparation and continuing support for the tasks involved and,
- the instructional methods and materials, the teachers, the learning environment, and other services are adequate to provide instructions of good quality that the student can benefit from and understand.

Using the available instructions, the student can learn at a rate adequate to reach the prescribed level of performance in the time allowed. The time the student needs to learn is allocated in the instructional programme. The instruction and the student's prior experience influence the student to feel confident that he will perform successfully, remain attentive to the instruction, and will persist in completing the prescribed learning activities. As a result the student spends the time, actively engaged in learning so that he reaches the level of performance defined as mastery.

The mastery model is therefore designed to structure the curriculum and instructional programmes to maximize the likelihood that each student will have sufficient opportunity to learn from high quality instruction and will be provided with adequate instructional time to enable him to attain mastery. The mastery model also incorporates principles and programmes derived from Goodland and Anderson's work with Non-Graded Elementary School and the Open Classroom (1959). The work of Computer Assisted Instructions (CAI) by Suppes, and Atkinson (Suppes, 1966; Atkinson, 1968) and Glaser's work in Individually Prescribed Instruction (IPI) at the Pittsburgh Learning Resource Development Centre (1968) also formed part of the mastery model.

The mastery process was influenced by the work of Gagne and Paradise (1961) which suggested that some learning can be organized in a sequence in which mastery of each unit or learning task is a necessary prerequisite for mastery of the later, more difficult or more complex tasks. The distinction between formative evaluation which yields information to be used in the course of learning and summative evaluation, which measures final achievement in the
course, made by Michael Scriven, (1967) was also incorporated in the mastery model.

The work of Bloom *et al.* (1956) in developing taxonomies of educational objectives provided a strong impact on the mastery process, as did B.F. Skinner's work with programmed instructions. While mastery was receiving renewed attention in the 1960s' through works in education, educational psychology and curriculum development, experimental psychology was not left behind.

Fred S. Keller (1968) an experimental psychologist developed a similar approach to instruction in what was often referred to as the Keller Plan or the Personalized System of Instruction (PSI) which was strongly influenced by behaviourism and programmed instructions. Keller used his method to teach introductory psychology at the New University of Brasilia, Brazil in 1964. At the beginning of 1965, Keller's method was also used at Arizona State University (Wilson and Tosti, 1972).

Keller listed the following features which in his opinion, distinguished his method from conventional procedures within a mass education framework:

- the go-at-your-own-pace feature which permits a student to move through the course at a speed commensurate with his ability and other demands upon his time,
- the unit-perfection requirement for advance, which let the students go ahead to new material only after demonstrating mastery of that which preceded,
- the use of lecture and demonstrations as vehicles of motivation rather than sources of critical information,
- the related stress upon the written word in teacher student communication and;
- the use of proctors, which permits repeated testing, immediate scoring, almost unavoidable tutoring, and a marked enhancement of the personal-social aspect of the education process (Keller, 1972).

While future historians of education may say otherwise, the evolution of mastery learning as a model of school teaching and learning seems to fall into two distinct periods. The first period being dominated by the writings of Bloom at the University of Chicago (*there after, called as the Bloom period*). This period
spanned the years from 1968 to 1971. The second period dominated by the writings of Bloom's students and colleagues (thereafter called the post-Bloom period) which also spanned the time from 1971 till date.

**The Bloom Period (1968 to 1971)**

As discussed earlier, mastery learning as an idea is old. But, as the idea was periodically introduced in schools over the centuries from the Bobbit (1918) and Charter (1923) era, it constantly floundered due to the lack of a practical sustaining technology (Block, 1971). It was Bloom who first provided the theoretical and practical basis for such a technology (Block and Anderson, 1975).

Bloom's theoretical contribution to the evolution of mastery learning was to transform the conceptual model of school learning developed by Carroll (1963a) into a working model for mastery learning. Central to Carroll's model were three propositions:

1. The student's aptitude for a given subject should be defined in terms of the amount of time he needs to learn the subject to a given level, rather than the level to which the subject would be learned in a given amount of time. That is, aptitude should be reviewed as an index of learning rate rather than learning level,

2. the degree of learning for any student in a school setting is a simple function of the time he actually spends in learning relative to the time he needs to spend. Thus, each student is allowed sufficient time to learn a given subject to some specified level and if he spends the time needed to learn, the student will learn the subject to the specified level,

3. in a school learning situation, the time a student actually spends for learning a unit as well as the time he needs to spend will be determined by certain instructional characteristics. The two major instructional characteristics are the student's opportunity to learn i.e. the amount of classroom time allocated to learning the subject, and the quality of the subject i.e. the degree to which the presentation, explanation, and ordering of elements of the subject are optimal for the student. In addition to aptitude, the relevant personal characteristics are the student's ability to understand instruction and his perseverance.
Bloom’s practical contribution to the evolution of the mastery learning approach to instruction was to outline a classroom teaching strategy that would systematically vary as necessary, on how and how long each student was taught. For this purpose, he referred to the earlier approach of Washburn (1922) called the Winnertk Plan and especially to the approach of Morrison, (1926) at the University of Chicago’s Laboratory School. Based on these two approaches, Bloom proposed the basic elements of his own approach:

- the learner must understand the nature of the task to be learned and the procedure to be followed in learning it (thus, clearly specify what is to be learned and how it will be learned)
- the specific instructional objectives relating to the learning task must be formulated,
- it is useful to break a course or subject into small learning units and to test at the end of each unit,
- the teacher should provide feedback as to the learner’s particular errors and difficulties after each test,(assess students’ progress and provide appropriate feedback or remedial work ),
- the teacher must find ways to alter the time some individuals have available to learn (allow students to learn at their own pace),
- it may be possible to provide alternative learning opportunities,
- Student’s effort is increased when small groups of two or three students meet regularly for as long as an hour to review their test results and to help one another overcome difficulties by means of tests. i.e. (assess or test whether the final learning criterion outcomes has been achieved or not).

Post Bloom Period (1971 Till Date):

While Bloom turned his attention to theory (Bloom, 1976), a number of his students and his colleagues devoted their attention to developing the practice of mastery learning. At first, their efforts were concentrated on applying the theory and related practices to the improvement of classroom and then school wide practices.

Soon, it became apparent that interest in the evolving mastery learning approach had spread far beyond the classroom and school level. The entire
local, regional and even national school systems desired to plumb the potential of the evolving mastery learning approach for their particular problems (Block, 1979). As a consequence, the efforts of many individuals shifted to the improvement of system wide practices. Since system wide applications of mastery learning practices require the cooperative efforts of many individuals at many levels (University Faculties, school administrators, classroom teachers), a network of mastery learning practitioners was formed in the United States of America (USA). This network, known as the Network of Outcome-based Schools, is affiliated with the American Association of School Administrators (Arlington, Virginia). Its primary purpose was to encourage the discussion summarization, and dissemination of mastery strategies, practices and materials.

Also since the mid-1970s, mastery learning has been applied to an ever-increasing variety of subject areas (many technical in nature) and extended beyond the secondary school level. Other subjects like geography, biology, psychology, sociology, music, public administration and allied health, nursing, pharmacy and veterinary pathology have experienced the encroachment of mastery learning.

VARIABLES OF MASTERY LEARNING STRATEGIES:

The roots of Mastery Learning Strategies (MLS) may be traced from the work of Carroll, (1963a), influenced by the ideas of Skinner, (1954); Goodland and Anderson, (1959); Suppes, (1966); Bruner, (1966) and Glaser, (1968) respectively. The following five variables are usually taken into account when dealing with mastery learning strategies.

- aptitudes and learning rate,
- ability to understand instruction,
- quality of instruction,
- perseverance, and,
- time allowed for learning.

Aptitudes and Learning Rate:

Aptitude is the ability to understand instruction. It represents the students' ability to generally profit from the instruction and is closely identified with general intelligence. Aptitude is the amount of time required by the learner to attain mastery of a given learning task (Carroll, 1963b). When time was held constant,
then the individual differences in aptitude played an unusually greater role in students' achievement. Aptitudes for particular learning tasks are not completely stable and may be modified by appropriate environmental conditions or home and school learning experiences (Hunt, 1961; Bloom, 1964). Sjogren (1967) found a significant positive relationship between the ratio of time spent to the time needed and the learning measures (the achievement tests and the aptitude scores). Hence, instructional treatments may be developed to interact with students' aptitudes (Cronbach and Snow, 1969). It has been concluded that alignment and aptitude positively affect students' learning outcomes (Koczor, 1984).

Particular aptitudes were found to be related to learning rate for each task (Stone, 1984). Kim, (1968) found that memory prognosticated learning rate for German words, Reasoning, Number facility, and Spatial relations prognosticated learning rate for statistical concepts, Operations and logical syllogisms respectively. Airasian (1969) stated that aptitudes are most clearly predictive of students' learning rate for initial or lower level skills. Stone, (1984) concluded that difference in the rate of mastery between high and low aptitude students not only decreased, but the trend lines crossed so that for the final mastery task, the low aptitude students took less time to complete. Bachmann, (1985) also found that cognitive aptitudes did account for less variance in predicting learning rates in the computer management courses. Another study conducted by Blakemore (1985) and Salim, (1988) reported that low aptitude students were benefited from the conditions of mastery learning.

If aptitude is predictive of the rate at which a student could learn, then, it should be possible to fix the degree of learning expected of students at some mastery level and to systematically manipulate the relevant instructional variables in Carroll's model such that all or almost all students attain mastery (Bloom, 1964; 1968; 1971; Block, 1971; 1975).

Bloom argued that if students were normally distributed with respect to their aptitude for a subject and were provided uniform instruction in terms of both quality and time, then, their achievement at the subject's completion would be normally distributed. Furthermore, the relationship between aptitude and achievement will be high (Block, 1975).
However, if students were normally distributed on aptitude but each received optimal quality of instruction and were provided with adequate learning time, then, a vast majority of students could be expected to attain mastery. In addition, there would be little or no relationship between aptitude and achievement. Figure 1.1 showing normal distribution of aptitude has been placed below:

![Figure 1.1: Normal Distribution of Aptitude](image)

**Instruction per learner**

a) Uniform  
b) Optimal

**Ability to Understand Instruction:**

The ability to understand instruction may be defined as the ability of the learner to understand the nature of the task he is to learn and the procedures he is to follow in his learning (Block, 1971). Mastery Learning Strategy (MLS) plays a vital role for different ability levels of children. Chen (1992) concluded that Mastery Learning Situations promoted the learning outcomes of Maths for non-disabled children, disabled children, and for educable mentally retarded children. Students who are high in certain given abilities are likely to perform better if the material is presented in a mode, which emphasizes those abilities (Yates and Pidgeon, 1957). Similarly, persons who are low in certain abilities may be put at a disadvantage if the mode stresses those abilities (Behr, 1967; Davies, 1967). Hence, the ability to understand instruction as measured by verbal intelligence
tests is an important determinant of level of achievement in schools (Yates and Pidgeon, 1957).

**Quality of Instruction:**

This is the degree of which the presentation, explanation and ordering of elements of the learning task optimizes for a given learner (Carroll, 1963b). Poor quality of instruction affects high as well as low intelligent students (Carroll and Spearitt, 1967). Improving the quality of instruction can optimize the learning of particular learners (Cronbanch and Snow, 1969). Hence, mastery learning is a promising approach and its effectiveness has been proved for different intelligent quotients (I.Q.) of students (Kim *et al*; 1969); disadvantaged group (Thakur, 1987; 1990); high average and low socio-economic groups (Chaudhary and Vaidya, 1991; and educationally disadvantaged group (Lai and Biggs, 1994). Thus, the use of a variety of instructional approaches improves the quality of instruction and instructional methods should both maximize each learner's performance and minimize the time he requires to obtain optimal performance (Behr, 1967).

**Perseverence:**

The time the learner is willing to spend in learning is termed as perseverance (Carroll, 1963a). The evidence for a trait called perseverance has been characterized as keeping on at task (Thornton, 1939). Carroll and Spearitt, (1967) found an interaction between intelligence and quality of instruction with respect to the students' willingness to persevere on a difficult post experimental task. Students who used high quality of instruction spent more time on the post task if they were in the high or the low, but not in the middle intelligence groups. Thus, poor quality of instruction decreased perseverance for high and low intelligence students and increased it for the average intelligent students (Carroll and Spearitt, 1967).

**Time Allowed for Learning:**

Instructions can be individualized to meet the needs and capacities of the child only when achievement replaces time as the constant factor in schools. Individual methods save students' time especially for the faster students as compared to the traditional methods (Washburn, 1922) but the speed of learning varies from subject to subject (Smith and Eaton, 1939).
Carroll, (1963b) emphasized that if time is kept constant, then individual differences in aptitudes play important role in achievement and time criterion was significantly related to intelligence and ultimately to achievement (Carroll and Spearitt, 1967; Glaser, 1968). Variation in time needed to complete a learning task (since time spent was fixed) was reported to have a significant relationship with both general intelligence and achievement measures (Sjogren, 1967). Mastery Learning Strategy (MLS) has shown its effectiveness over time. When more material was provided to mastery learning students, they still learned this material in less time as compared to the control group (Merrill, Barton, and Wood, 1970). However, if time were held constant, no significant difference would exist between mastery learning students and control group (Holtz, 1978; Anderson, 1993).

Mastery Model is particularly useful for those aspects of curriculum devoted to the teaching of basic skills, concepts, and facts that must be measurable with accuracy sufficient to distinguish students who have learned successfully from those who have not (Lai and Biggs, 1994). These may be achieved by employing all the five components of the mastery structure. Each of the components play an important part in organizing the curriculum efficiently, by ensuring that students enter their own levels of progress at their own pace. The components also give each student the greatest possible exposure to the instruction most likely to help him reach his goals.

BASIC ELEMENTS OF MASTERY LEARNING STRATEGIES

Basically, in order for mastery learning programmes to become effective in schools, and more so in classrooms, it's four major basic tasks must be accomplished. These tasks are:

- defining mastery,
- planning for mastery,
- teaching for mastery, and
- grading for mastery.

Each of these sub-tasks serves an important function within the context of mastery learning (Anderson and Anderson, 1982). And must therefore be well understood by a mastery learning developer who must focus on the nature and significance of the tasks and sub-tasks which are more appropriate for fostering
a general understanding of mastery learning as a model of school teaching and learning.

**Defining Mastery:**

Mastery learning is defined in terms of educational objectives which each student is expected to achieve. Mastery learning has got educational objectives having cognitive, affective, and psychomotor domains in it. The term *Mastery* was used by Morrison for the method of securing mastery of a subject matter, in which testing forms the beginning, middle, and the end of the teaching learning process so that teaching may be appropriately adapted to the needs of the learners (Good, 1967).

Mastery learning is the type of instruction where students must meet a criterion of competence on a unit before progressing to the next unit (Encyclopaedia of Educational Media Communication and Technology, 1992). Such a criterion is often ninety-percent comprehension on a multiple-choice test (Block and Anderson, 1975). And among the comprehension of mastery learning components that are commonly used and required additional time to acquire mastery are:

- pre-test of the learner's competence,
- specification of behaviour objectives,
- formulation of diagnostic evaluation and,
- criterion-referenced summative evaluation (Block and Anderson, 1975).

The principle defining characteristic of mastery learning methods is the establishment of a criterion level of performance held to represent mastery of a given skill or concept, frequent assessment of students' progress towards the mastery criterion, and provision of corrective instruction to enable students who do not initially meet the mastery criterion to do so on a later parallel assessment (Block and Anderson, 1975; Bloom, 1976). What really defines mastery learning approach is the organization of time and resources to ensure that most students are able to master instructional objectives (Slavin, 1987).

Mastery learning programmes are outcome-based. Defining mastery therefore encompasses:

- the specification of long term and short term learning outcomes,
- specification of abstract outcomes i.e. (goals) and
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- Concrete representations of these abstract outcomes i.e. (tests) and acceptable levels of performance on the tests.

Communication of the learner and learning expectations to students, teachers, administrators, and parents is one major function of defining mastery by clearly specifying the goals, tests, and performance standards at both the course (long-term) and unit (short-term) levels. This involves substitution of excellent learning of a limited number of highly desirable objectives termed as mastery emphasis. The objectives selected must be those with greatest potential for transfer or applicability to future learning. Once the objectives have been identified, a final summative evaluation test is prepared. The functions of this type of test are to:

- Assess the degree of student learning over the entire course, and,
- Evaluate the overall quality of student learning.
- Based on an examination of the objectives and related test items, a standard of performance for the summative test is set. When achieved, then, it will be accepted as mastery of the course. A standard which typically corresponds to the scores attained or surpassed by the best students taught by traditional or non-mastery methods are normally set in learning situations. Mastery learning is based on the way in which the entire course is divided into a series of smaller learning units. A set of objectives for each learning unit is based on identified or hypothesized interrelationships, and is usually delineated. Each unit is long enough to allow sufficient time for students to learn an interrelated set of facts, concepts, principles, skills and appreciation. In order to allow or permit close monitoring of each student’s learning as the unit or course progresses, the units are usually short enough. The function of such units is to facilitate the teaching and learning of new objectives in contextual format rather than in isolation.

- Sequencing the units is of paramount importance in mastery learning situations. The ordering (sequencing) allows the facts, concepts, principles, skills, and appreciation acquired in one unit to be used over again in other subsequent units. Sequencing approach helps to ensure that concept learned in the unit(s) will not be forgotten by the students. Hence, their availability for use in a later date is ensured. Students, who
also have mastered the objectives of the previous unit(s) have got increased likelihood that subsequent objectives will be at an appropriate level of difficulty.

Mastery learning also involves **what will constitute mastery of each learning unit**. This involves designing appropriate tests for assessment of students learning unit objectives. These tests termed as **formative tests** are intended to help and guide teachers in identifying students’ errors and misunderstandings.

The use of such information is to improve on students’ learning rather than to evaluate the quality of that learning. At the same time, performance standards are also set for each formative test just like it is in summative evaluation. Mastery performance standards will help the teacher in the determination of those students who have successfully mastered the unit and those who will require additional time and corrective individualized instructions if mastery is to be attained.

**Planning for Mastery Learning:**

While planning for mastery, every step must be taken to be inconsistency with the way in which mastery has been defined. Planning must ensure that students acquire the objectives of each learning unit and these objectives must be well defined. Plans must also include all activities and materials related to the unit objectives and must include additional supplementary activities and materials for those students failing to attain the performance standards on the unit formative test. Planning for mastery permit teachers to be proactive in their classroom teaching.

Proactive teachers are usually ready to deal with any situations as they arise and may elicit solutions of any problem on the spot. They can anticipate likely problems and may respond in one of a variety of appropriate pre-planned ways. The essence of planning is to enable teachers to monitor students’ learning on a unit by unit basis.

While planning, chances for intervention steps must be taken into consideration to cater for any evidence gathered from the formative tests and (other sources such as homework) that may suggest that learning is not proceeding as was expected or desired. Ultimately, the desired degree of
learning is attained. Incase steps are not taken to overcome the errors and misunderstandings identified by the tests, then these errors and misunderstandings will probably accumulate and interfere with future learning.

**Sub-tasks of Planning for Mastery:**

These include the following:

- **Design a general plan for helping all students master the unit objectives.** This focuses on two important aspects of high quality instructions i.e.
  - The material relating to each objective should be presented in a way that is appropriate for the vast majority of students in the classroom;
  - The activities in which the relevant material is embedded should involve or engage the vast majority of students in the process of learning. This is usually referred to as the original instructional plan *(Block and Anderson, 1975).*

- **The preparation of methods for interpreting and using the information gathered from the formative tests:** This involves the development of a set of alternative instructional materials and learning activities which are keyed to each objective on the units' formative tests. These correctives are designed so as to re-teach each unit's objectives, in ways that are a bit different from the original instruction. Typical example here involves the use of small group study sessions, peer or cross-age tutoring, alternative learning aids i.e. different text books, work books, and audio visual materials *(Block and Anderson, 1975).*

- **If corrective remedial instructions are to be used during regular class time,** then, plans for those students initially achieving mastery on the formative tests must be designed *(Anderson and Jones, 1981).* In order to achieve this task; several options are to be presented over the duration of a mastery learning programme. These options are:
  - **Option One:** This option involves the use of initial masters as tutors for non-masters *(Anderson and Jones, 1981).* In order that the option must be entirely successful, students must be willing to serve as tutors and should have specific tutorial materials available. They must also be trained as tutors *(Anderson and Jones, 1981);*
♦ **Option Two:** This requires that the initial masters be permitted to complete work in other subject areas or engage in non-academic work such as recreational reading;

♦ **Option Three:** In this option, the initial masters are required to engage in structured independent study. Under this option, students are required to:
  a) specify what they are to learn,
  b) specify how they will learn it and,
  c) specify how they are to demonstrate what they have learned.

    Such independent study reinforces the basics of mastery learning *(Anderson and Jones, 1981).*

♦ **Option Four:** This option allows the students to engage in *vertical enrichment.* In other words, students’ pacing permits *faster* students to engage in *horizontal enrichment.* That means they progress from unit to unit acquiring an increasing number of concepts, facts, and skills. *Vertical enrichment* consists of materials and activities that allow students to probe more deeply into the content and ideas included in a learning unit by examining the relationships among the content and ideas within or across units *(Anderson and Jones, 1981).*

When planning for mastery, the teacher develops study guides consisting of an introduction, a statement of objectives, suggested study, procedures, the course material in simplified terms, and a set of study questions.

The study guides therefore, present course materials in small and logical sequential units that enable students to entirely respond by solving problems presented to them within the study guide itself *(Ruskin, 1976).*

Planning also involves the preparation of *formative tests* which will be administered at the end of unit instructional programme to determine the levels of learning outcomes of the students.

*Functions of Time for Planning Mastery Learning:*

Time devoted to learning is one of the most important inputs in strategies designed to improve the quality of educational outcomes *(Tedesco, 1997).* The
more efficient and effective use of the time that pupils spend in schools depend upon the following:

- Improving the working conditions of teachers, so as to avoid the high level of absenteeism that is found particularly in rural and marginal urban schools (Tedesco, 1997) and;

- Changing management methods which would reduce the amount of time that teachers spend on administrative matters, not connected with the learning process (Tedesco, 1997). Thus, the amount of time that the learners pass in schools without changing the teaching / learning methods, the teachers' working conditions, or the organization of their activities will achieve nothing. Hence, the importance of time as a basic input in explaining learning achievements should not be underestimated. Rather, more attention should be paid to modifying other variables i.e. (teachers', methods, and management) taking into account their impact on an increase in learning time, and less to other criteria not connected with the quality of educational outcomes (Tedesco, 1997).

When planning for mastery learning, functions of time are of paramount importance. Time should provide the opportunity for realistic estimates of the amount of material and objectives that can be included in a course. Each student is constrained to spend as much time as necessary to master the objectives of one unit before moving to another learning unit. Planning therefore increases the quality of time that each student spends in learning. This enables the students to increasingly possess the knowledge and skills necessary to gain from each subsequent unit's instruction. This is because they are being exposed to several ways of presenting the material by getting involved in learning (Postlewait, 1964; Bloom, 1968; 1974; Block, 1970; Carroll, 1971; Anderson, 1976; Anderson and Jones, 1981). In mastery learning, approximate amount of time must be allocated to the original instruction and for testing (Block and Anderson, 1975).

**Teaching for Mastery:**

- The teacher provides orientation to the students regarding mastery learning procedures,
The teacher teaches the first learning unit, administers the unit criterion test, identifies the non-achievers and asks them to use the appropriate corrective remedial measures to complete their unit learning.

**Orientation of Students:**

The task of orientation involves:

- Informing the learners of what they are expected to learn,
- How they will learn it,
- How they are expected to demonstrate their learning abilities,
- How the adequacy of their learning will be judged, and,
- They must be told about the grading system (emphasizing) that their learning will be graded relative to a predetermined performance standard, not relative to the learning of their classmates, and
- They are also told that they will receive extra time and help as needed in order to ensure their learning is complete.

**Initial Instruction of Learning Units:**

The teacher’s ability to manage the operations of *instructional sequences* is one major parameter that will automatically ensure mastery learning of the learning tasks (Hilgard and Bower, 1986). This could be achieved through:

- Monitoring of the student’s progress,
- Diagnose difficulties and provide proper remedial work for them,
- Give or provide precise and enough encouragement for good performance (corrective remedial feedback) and,
- Give and provide reviews and practices to all that will maintain students’ learning over a long period of time (Hilgard, and Bower, 1986).

Instructions in mastery learning are organized into well-defined learning units. Each unit consists of a collection of learning materials, which are systematically arranged to teach the desired unit objectives. Before the student proceeds on to the next stage of learning task, a complete mastery of each unit is required as a pre-requisite skill. All learning units must therefore be sequenced in such a way that learning of each unit is built upon the prior learning having a chain of connections or links (Gagne, 1965; 1970; Bigge, 1967). This therefore requires ungraded diagnostic progress test, which is administered at the end of...
each unit to provide feedback on the adequacy of the students’ learning capability. Unit wise tests indicate unit mastery and reinforce learning. It also highlights the material that students still need to master.

On the basis of such learning information, each of the learner’s original instruction is supplemented with appropriate learning correctiveness. This will make the learner complete learning, hence, acquire mastery of the concepts.

In order to avoid what Arlin (1984) called a Robin Hood Approach, to time allocation in mastery learning, many applications of mastery learning provide corrective instructions during lunch, recess, or after school hours (Slavin, 1987). The practicality of mastery learning may be seen when Bloom, (1984) stated that the time or other costs of the mastery learning procedures have usually been very small.

In certain circumstances, it may be appropriate that school administrators, parents, teachers associations and even other interested parties join hands together in theory and practice to provide tutors / teachers to administer corrective remedial instructions outside the class time (Slavin, 1987).

Teaching if viewed as a process, concerned with the management of learning ought to be a simple matter (Scriven, 1967). The functions of the teacher are to follow the following ingredients for mastery approach.

- Specify what is to be learned,
- Motivate students to learn,
- Provide the learners with instructional materials to foster learning,
- Present and administer the materials at a rate suitable and / or appropriate for different learners,
- Monitor students progress,
- Diagnose the learning difficulties and provide proper timely remedial instructions to them,
- Give praise, reward, and encouragement for good performance, and,
- Give review and practice that will maintain high rate of learning over long periods of time (Scriven, 1967; Carroll, 1971).

The units are taught using almost purely individualized methods, and reading is the mode used by most students. The teacher presents basic features of Personalized System of Instruction (PSI) at the completion of each unit,
monitors and gives unit criterion and formative tests. Re-study and re-testing circles continues until the students achieve grade A (Carroll, 1971).

**Teaching Each Learning Unit in Sequence Using the Original Instructional Plan:**

Upon the successful completion of initial instructional plan and before moving on to the next instructional unit, administration of the unit's formative test is performed. Those students who have achieved performance standards based on formative tests are certified and those who have not are identified. Those students who were initially classified as masters are free to engage in enrichment activities or to serve as tutors for the slower classmates. This means that the non-masters students move on to the corrective stage of the mastery learning instructional model.

However, it is important to announce the day on which the initial instruction relative to the next unit will begin. If teachers desire to postpone the start of the next unit, students are given adequate time both in-class and outside class to complete their assignments and select corrective activities and materials. If not, then, **Out of Class Time** must be used. This means that the teacher has got to use two phases of corrective instructions.

**The first phase** provides corrective instruction for those objectives not mastered by a substantial number of students. Such massive non-mastery indicates an instructional problem. Additional class time can therefore be taken to provide the whole-class or a large group corrective instruction relating to such objectives.

**The second phase** provides alternative activities and materials which are keyed to each objective and which can be used for corrective instruction. In this way, a sheet of paper identifying each objective, appropriate test items and recommended activities and materials can be presented to each student. Under such criteria, the objectives not mastered can be designated in some manner. Such a sheet serves as a **feedback** or **corrective vehicle** to the learners. Students are expected to explore these alternative ways of learning, to select with the teachers' guidance those objectives suitable to their individual needs and interests. They are also expected to spend sufficient time engaged in the learning activities.
This circle of original instruction, formative testing, and certification or correction is repeated unit by unit until all the units have been covered. It is a Teacher Paced Cycle so that much materials and as many objectives as possible would be covered within the available time, had traditional methods of instruction been used. Teacher Paced Instruction helps to ensure that all students (the fast as well as the slow learners) are exposed to the learning material as much as possible.

**Grading for Mastery:**

The function of grading in mastery learning programmes is to reward students for the acquisition of the essential critical course objectives. Grades are assigned to students based on their performance on the summative test relative to the pre-determined performance standard, not based on their relative to the performance of other students. Such mastery grading is designed to engage students in competence motivation (White, 1959; Block, 1977; Woolfolk, 1993). Motivation is preferable to competition (Block, 1977). The nature and form of grading policy depends on the fact whether the students' performance will be tested only through unit tests or they will also take a final summative test.

**Sub Tasks for Grading for Mastery:**

- **Administration of Summative Test:** All students whose scores are at or above mastery performance standard earn grades of A or equivalent.

- **Grading of Students who Scores Below the Performance Standard:**
  - **Option I:** Assign grades of incompletes or (equivalent) to these students. These students have not yet spent sufficient time or received sufficient help. This is termed as open transcript, which is required for the students of this category. Open transcript allows students to demonstrate and receive credit for improved levels of performance at any time.
  - **Option II:** Under this category, assign the remainder of the traditional grades i.e. (A B C D E and F) to scores at various gradations below the mastery performance standard. The grades assigned to these students should reflect the number of objectives acquired as evidenced by their performance on the summative test. Even a grade of F should indicate the acquisition of some number of objectives (Ruskin, 1976).

The use of summative evaluation for grading purposes is highly recommended (Block, 1970; 1977; Block, and Anderson, 1975; Ruskin,
If this recommendation is followed then, multiple summative tests must be prepared when defining mastery.

With proper use, the final examination serves the major function of allowing the students to collect all the contents learned throughout the course. It also serves as a useful check on those students who may have used less than laudatory methods for getting through the course. Most of the PSI instructors, who opt to test the students on summative evaluations, usually administer tests only once i.e. (at the end of instructions). However, in self-paced PSI courses, it is quite reasonable to give the final test at several different times during the instruction (Melvin, 1970; Ruskin, 1976). This allows the early finishers to reap the full benefits of their rapid pace and complete PSI course weeks before the conventional end of the semester or quarter (Scriven, 1967; Ruskin, 1976). In PSI approach, students can be termed as only masters or non-masters. So the only possible grades can be A or No grade (Ruskin, 1976).

COMPONENTS OF MASTERY LEARNING STRATEGIES:

Mastery Learning Model has got five components:

- Objectives,
- Pre-assessment,
- Instruction,
- Diagnostic Assessment (which covers enrichment and prescription), and
- Post Assessment.

These components have important functions in helping the students learn basic skills, concepts, and facts by ensuring that they enter at their own levels and progress well with the help of prescription. The components also provide each student the greatest possible exposure to the instructions most likely to help them in reaching at their goals, on the basis of prescriptive enrichment material and remedial work.

Objectives:

These are specific statements of learning outcomes that students in the instructional programme are expected to achieve. Objectives define specific skills, key concepts and the ideas or specific facts that each student must learn in order to complete the learning tasks successfully. Objectives are defined in
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minimum levels of performance, essential for each student to attain. These performance levels are termed as mastery.

Pre-Assessment:
This component of mastery model determines each student's starting point and methods of instruction, which the teacher uses in the programme. This assessment identifies each student's capacity relative to the learning outcomes he is expected to achieve by the end of the programme. It incorporates the student's prior observations and judgements of the teachers, and other information supplied by the students themselves.

Instruction:
Selecting instruction for the programme is based on the belief that the student should use the instruction to proceed from his initial status to mastery of the objective. At the same time, there is no restriction that can be used in a mastery programme. The teacher may select any instructional option he prefers where more than one appropriate instructional method is available.

Diagnostic Assessment:
While the instruction is in progress, diagnostic assessment component provides information concerning how well the instructional programme is working. This assessment procedure measures what each student has learned and what he has failed to learn at regular intervals throughout the instructional programme. The information got, is used to pace the student's learning and ameliorate those segments of the instruction that have not been quite effective. Diagnostic component is therefore crucial in adapting the instruction to the needs of the individual students.

Prescription:
This component of mastery structure consists of instructional activities recommended on the basis of diagnostic assessment. When the diagnostic assessment shows that a student needs further instruction, the prescription is remediation. The student is then provided with additional instruction or alternative instruction or he repeats the instruction he has just completed. When the diagnostic assessment indicates that he does not have the prerequisite skills needed to perform successfully in this instruction, or when it becomes apparent
that a different objective would be more appropriate, then, relocation is prescribed to such students.

The student may proceed to another topic or receive special instruction to develop the most needed prerequisite skills before proceeding on with the programme. But, whenever the student has performed successfully and would benefit from continued instruction, then, enrichment materials and instructions are provided.

*Enrichment* is composed of additional learning activities at approximately the same skill level as the instructional activity the student has already completed. When students complete their prescribed instructions, then, an alternate form of diagnostic assessment is administered. The student continues recycling through remediation and diagnostic evaluation until he performs at the minimum pass level. Recycling should be continued until the student has mastered the crucial skills, or the student should be placed in another objective sequence.

If more than one objective is included in an instructional sequence, then the instruction and diagnostic evaluations for the other objectives in the sequence are completed in the manner described and when the sequence has been completed, the final assessment procedure is administered.

**Post-Assessment:**

The last component of mastery model is termed as *post-assessment*. It measures whether or not each student has reached the learning outcomes identified in the objectives. Students’ mastery of each of the crucial skills, concepts, and facts as defined in the objectives are measured. Once a student has failed to master a crucial objective, he is either recycled through the instructional programme or additional instruction is prescribed for him as part of his next instructional programme. The student continues to receive instruction until he reaches at the minimum pass level. A diagrammatic illustration of the components in the mastery structure as developed by Torshen, (1977) is placed in Fig.1.2 below.
Figure 1.2
Components of the Mastery Structure (Torshen, 1977)

I. Objective
II. Preassessment
III. Instruction
IV. Diagnostic Assessment
  Sufficient Progress?
   Yes
   Continue I-IV until instruction is completed
   Enrichment
   No
   Prescribe corrective instruction
   Remediate
   V. Prescription
   VI. Postassessment

Modify objective or select different objective
Relocate
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Approaches To Mastery Learning:

What really defines mastery learning approaches is the organization of time and resources to ensure that most students are able to master instructional objectives. Bloom (1976; Block, and Anderson, 1975), stated that the use of such instructional variables as cues, participation, feedback, and reinforcement as elements of mastery learning is of paramount importance (Slavin, 1987).

Two genotype approaches to the use of these ideas and practices involve the following:

➢ **Group-Based Teacher Paced Approach (GBTPA):** where students learn cooperatively in group with their classmates and the teacher controls the delivery and flow of instruction (Block, and Anderson, 1975). This approach has evolved from within the field of education and has had a major impact at the elementary and secondary schooling levels (Bloom’s MLS).

➢ **Individual-Based and Learner Paced Approach (IBLPA):** In this approach, students learn independently of their classmates and each student controls the delivery and flow of instruction (Keller, 1974; Potlethwait et al., 1964). This approach also evolved from the fields of Psychology and Biology and has had its major impact at the college and University levels (Keller Plan).

The two mastery-learning approaches are similar to, yet different from other individualized instructional approaches like:

- Individualized Prescribed Instruction (IPI);
- Individually Guided Education (IGE);
- Programme For Learning According to Needs (PLAN), and;
- The Matching of the Learning Styles with Teaching Styles (MLSTS).

The major similarity lies in their attempts to provide instructional settings that will accommodate a diversity of students. These approaches attempt to modify the instructional setting so that students possessing a variety of entering abilities, skills, knowledge, attitudes and values can succeed. The major differences reside in the type and timing of the individualization.
Thus, Mastery Learning is built on the assumption that the majority of children can become equal in their ability to learn standard school tasks. According to Bloom (1981), ninety five percent of the population are equally capable of learning. Piaget, (1954; 1958; Bruner, 1956) and others provide evidence that students progress well through stages of cognitive, language, social, moral, artistic, and physical stages at different rates. Therefore, there is much research that would refute Bloom’s assertion that ninety five percent of children have nearly the same potential for learning (Carl Glickman, 1979).

**Bloom’s Mastery Learning Strategy (B-MLS):**

Bloom’s Mastery Learning Strategy (B-MLS) consistently helps students to learn excellently, quickly, and self-confidently. Bloom’s (1974) Mastery Learning is a Group Based and Teacher-Paced (GBTP) Approach. Students learn co-operatively with their classmates and the teacher controls the delivery and flow of instruction. The prototype for this approach is Bloom’s Learning for Mastery (Block and Anderson, 1975). The approach has evolved from within the field of education and has had a major impact at the elementary and secondary levels of schooling (Eraut, 1989).

Some of the basic features of Bloom’s Mastery Learning Strategy are summarized (McNeil, 1969):

- The learner must understand the nature of the task to be learned and the procedure to be followed in learning it,
- The specific instructional objectives relating to the learning tasks must be formulated,
- It is useful to break a course or subject into small units of learning and to test them at the end of each unit,
- The teacher should provide feedback for each learner’s particular errors and difficulties after each unit test,
- The teacher must find ways to alter the time some individuals have available for learning,
- It may be profitable to provide alternative learning opportunities,
- Students’ effort is increased when small groups of two or three students meet regularly for at least an hour to review their test results and help one another to overcome learning difficulties identified by means of the test.
Block and Anderson, (1975) have also summarized the conceptual framework of Bloom’s Learning for Mastery Strategy (B-MLS) as follows:

> **Defining Mastery:**
  - By formulating a set of course instructional objectives,
  - Preparing a final or summative examination over these objectives and determining the course mastery performance standard which the students will be expected to achieve on this examination,
  - Sequencing the learning units and determining the course objectives to be covered in each unit,

> **Teaching for Mastery:**
  - The teacher provides orientation to the students regarding mastery learning procedures,
  - The teacher teaches the first learning unit, administers the unit criterion test, identifies the non-achievers and asks them to use the appropriate corrective remedial measures to complete their unit learning.

> **Planning for Mastery:**
  - The teacher prepares lesson plans by using his customary Group Based Teacher Paced (GBTP) methods,
  - Develop corrective feedback procedures,
  - Develop a set of alternative instructional materials.

> **Grading for Mastery:**
  - Administration of summative / criterion test,
  - Awards A to the students who performed equal or above the course mastery performance levels,
  - Completion of the students is with themselves, rather than with their classmates.

*Keller’s Personalized System of Instruction (PSI):*

The Keller Plan also known as the Personalized System of Instruction (PSI) is an attempt to deal with some of the management problems associated with a prescriptive work-sheet (Harris, 1979).
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The PSI is Individual Based and Learner Paced Approach (IBLPA). Students learn independent of their classmates and each student controls the delivery and flow of instruction. This approach has evolved from the fields of psychology and biology and has had its major impact at the College and University Levels (Eraut, 1989). It is a system of learning in which clear objectives, related resources, and mastery testing procedures are used. It is also an approach to instruction that is explicitly designed to convert the role of the teacher from the dispenser of information to the engineer or manager of all students' learning (Block, 1974).

For the purpose of the present study, only Bloom's Group-Based Mastery Learning Strategy (B-MLS) was used. Within Bloom's MLS, instructional plans were designed by using Advance Organizer Model (Ausubel, 1960) for the initial instruction. Two kinds of Advance Organizers viz: Generalization and Analogy were compared through Bloom's Mastery Learning Strategy (B-MLS).

In the subsequent paragraphs. The theoretical framework of Ausubel Model (Advance Organizers) has been discussed.

THE THEORETICAL FRAMEWORK OF AUSUBEL’S MODEL

ADVANCE ORGANIZERS

Of all the Information Processing Models, Taba's Model (Taba, 1966), can be described as an inductive teaching strategy which is designed to teach generalizations. It is potentially large in scope, capable of organizing lessons or units of study.

Just like Taba's Model, Ausubel's Model (Ausubel, 1960), has got the potential of being used in all individual lesson or as an organizational pattern for curriculum designing, hence, a deductive strategy. An organizing statement called advance organizer acts as a connection between the material to be learned and the learner's cognitive structure (Eggen, Kauchak and Harder, 1979; Kiewra, 1997; Shushama, 1998). It also acts as a cognitive road map, guiding the students over the new content to be learned. Ausubel's model is also a deductive information processing model designed to teach interrelated bodies of content where broader or more inclusive ideas are presented first, followed by less inclusive ones. Advance organizers are therefore instructional sets designed to provide students with an understanding of what the lesson is all about. They
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are one of the two cognitive strategies (the other one is Metaphor) that enables
the learner to recall and transfer knowledge to the new topic (Heinich, Molenda
and Russel, 1989; West, and Wolff, 2001).

An advance organizer is a bridging strategy that provides a connection
between one unit and another. It also acts as a schema. This connectivity is
achieved through the advance organizer that organizes new materials to be
presented by outlining, arranging and logically sequencing the main ideas or
procedures in the new material based on the learner's prior knowledge. Advance
organizers are some frames of reference that give students conceptual frame
works into which lessons, ideas, concepts, and facts can be placed in an
organized fashion.

The organizers are brief prose passages about a paragraph of length, which introduce the new material before it is presented. They are rich and
powerful transition statements (Heinich, Molenda and Russel, 1989; Stollak,
Mary Alice, Alexander and Lois, 1998; West and Wolff, 2001). The organizers
are at a higher level of abstraction and generality than the actual facts, concepts
and generalizations that form the lesson itself (Eggen, Kauchak and Harder,
1979). They usually link the material to the more abstract idea which already
exists in the learner's mind. An advance organizer is not a summary or an
overview since both of these are present at the same level of abstraction and
generality and the learning material itself.

Thus, Ausubel's Model is a model designed to teach organized bodies of
content in a single lesson. It is therefore an organizational guide for curriculum
development. Organizers facilitate the learning of factual materials more than
they do on the learning of abstraction materials. Abstraction in a sense contains

The value of advance organizers particularly depends upon how well
organized the learning material itself is and are helpful in situations where the
teacher must organize the content and are more necessary with less abstract
and less organized materials. Advance organizers may be summarized as
statements that are introduced in advance of the learning material itself and are
designed to help the learner learn and retain new materials. They are also
instructional sets designed to provide students with an understanding of what the
lesson is about. Sometimes, advance organizers are referred to as frames of
reference (Eggen et al., 1979; Joyce, and Weil, 1990) which give students conceptual framework into which lessons, ideas, concepts, and facts can be placed in an organized manner. Hence, the organizer is at a higher level of abstraction and generality than the actual facts, concepts and generalizations that form the lesson itself. They therefore link the new material to more abstract ideas that already exist in the student's cognitive structure.

**MAIN FEATURES OF AUSUBEL'S MODEL:**

The main features of Advance Organizer Model of Ausubel can be summarized as follows (Hienich, Molenda, and Russel, 1989):

- The model begins with an advance organizer and proceeds by developing a structural, or conceptual hierarchy, and employs the process of progressive differentiation and integrative reconciliation (Ricci, 1999).
- The model is inter-active. Students like being involved in the lesson discussions rather than being passive listeners.
- Ausubel's model is deductive, with broader, more inclusive idea presented first.
- Ausubel's Lessons lend themselves to deductive format because of the extensive use of hierarchical outlines within the model. By its nature, a hierarchy has the most inclusive ideas at the top of its structure, followed by narrower and less inclusive ideas.
- The model uses exemplars or examples. Without the use of the examples, the abstraction is learned at the verbal rather than the conceptual level. Consequently, while introducing new concepts, or generalizations in an Ausubel lesson, the teacher must provide experiences to ensure that the abstractions taught are meaningful. This is true of all concept generalizations.
- Organizers facilitate the learning of factual material more than they do in the learning of abstract materials. Since abstraction contains their own built in organizers, (Ausubel, and Robinson, 1969).
- The value of advance organizers partially depends on how well organized the learning material itself is.
- Advance organizers are helpful in situations where the teacher must organize the content.
Also, in situations where hierarchy exists, the need for an advance organizer is not all that acute. However, advance organizers are more necessary with less abstracts and less organized materials. A complete structural outline of the Characteristics of the Ausubel Model has been appended in Figure 1.3 below.

Figure 1.3
A complete Structural Outline of the Characteristics of the Ausubel Model

Characteristics of the Ausubel Model

Interactive Uses Exemplars Deductive Sequential

Present Advance Organizer Present Subordinate Content

Differentiate Subordinate Material Ask for or Provide Examples of Subordinate Concepts or Generalizations Reconcile Differentiated Material

FORMULATION OF ADVANCE ORGANIZERS:
Ausubel’s planning phase involves formulation of an advance organizer. An advance organizer is a statement proceeding the lesson that is designed to help the learner store and retrieve material that was learned. In this way, the learner explores how individual concepts relate to each other and to the topic being taught. It links the content of the lesson to the learner’s cognitive structure by helping him organize materials that are to be learned. The model is therefore used most effectively to summarize and relate contents that have been previously learned in one way or the other.

Advance organizers are the practical implications of Ausubel’s subsumption theory of meaningful verbal learning. In subsumption theory, meaningful learning is determined by the organization of the learner’s prior knowledge to incorporate the new knowledge into a logical organization of information that leads to meaningful learning. Further researchers have revealed that this logical organization is facilitated through advance organizers operating
as a schema which organizes unstructured texts to induce long term retention and transfer of general concepts into the learners’ cognitive structure (Heinich, Molenda and Russel, 1993).

**Purpose:**

The purpose of an organizer is to bridge the gap between the known and the unknown. It is a means of capitalizing on student’s prior knowledge about the material and possibly on how the student has previously organized it. It allows for reflection on prior knowledge and to draw upon knowledge that would facilitate comprehension of the new knowledge. This facilitates information retrieval and ultimately, transfer.

**Main Features of Advance Organizers:**

- Advance organizer is a brief abstract prose passage about a paragraph that begins with an advance organizer, proceeds by developing a structured or conceptual hierarchy and employs the process of progressive differentiation and integrative reconciliation,
- It is a bridge that links between similarities of the known with the unknown;
- It is an introduction to a new material to be learned;
- Advance organizers are abstract outlines of new information and restatements of old knowledge;
- Advance organizers structure new information based on the old knowledge;
- Encourage transfer and application of old knowledge;
- Consists of substantial intellectual information.
- Advance organizers can also be used to teach concepts and generalizations themselves.
- The value of Ausubel’s model lies in its ability to relate previously encountered concepts with the new materials.

**Using an Advance Organizer:**

The underlying rationale behind advance organizers stems from the Gestalt Psychologists’ belief that an array of information is best learned by understanding how it fits together, what parts depend upon or support others and how it is organized (Ausubel, 1960).
There are various components in developing the instructional strategy. There are also several cognitive strategies that an instructional designer could draw when developing various components of instructional episodes. Metaphors are bridging cognitive strategies useful in information assimilation (Heinich, Molenda, and Russel, 1989). Just like metaphors, advance organizers are another form of bridging strategies that are quite useful in information assimilation. Designing instructional episodes stresses on the recall of prior knowledge relevant to the new knowledge before presenting a new material. Advance organizers like metaphors could also be used to make a strong connection and transition from the prior learned material into the new material to be presented. They are used to help students learn and are not created by students as part of their learning strategy. The use of advance organizers is restricted to verbal information, but can also be used for declarative procedural and conditional learning i.e. to aid the learner in knowing the what, the how and the when to learn (Heinich, Molenda and Russel, 1989).

The usefulness of advance organizers may be seen when using a concept map. The instructional design flow chart (IDFC) is one way of graphically displaying the various relationships and connections between the elements of a systematic instructional design plan i.e. (breaking down generalization into subordinates involving narrower and less inclusive ones which provide cognitive road maps for the materials that follow generalizations). Using the keyword method (KWM) of ASSURE (Heinich, Molenda, and Russel, 1989) is also quite important in advance organizers. Assure is an acronym utilizing the keyword method to aid recall of the various components of a classroom oriented instructional design model developed (Heinich, Molenda and Russel, 1989; West and Wolff, 2001). Its full meaning is stated below:

- A: Analyze Learners;
- S: State Objectives;
- S: Select Media and Materials;
- U: Utilize Materials;
- E: Evaluate / Review.
VARIOUS FORMS OF ADVANCE ORGANIZERS:

Advance organizers may therefore take three different forms known as:

- concept definition,
- generalization and,
- Analogy.

CONCEPT DEFINITION:

A concept definition is a summarization of the significant experiences that go into making a concept. It focuses attention upon important aspects of the experience while ignoring others and is a means of describing the boundaries of a concept. Hence, concept definition helps to determine set inclusion and set exclusion. A thorough concept definition relates the concept to a more inclusive concept or set and then lists some distinguishing characteristics that differentiate it from other concepts in the set. Attributes or characteristics of a concept are the distinctive features that a person uses to identify members of the concept. Through observing the attributes of concepts, abstraction process takes place (Markle and Tiemann, 1969). Without identifying the characteristics or attributes of a concept, the process of abstraction cannot take place (Markle and Tiemann, 1969). When learning a concept, students must first differentiate between the relevant and the irrelevant characteristics and then must encode the important attributes for later use (Markle and Tiemann, 1969).

Concept definitions are valuable means that foster the learner to achieve mastery learning when ever the material to be taught is new or unfamiliar to the student, definitions can be quite valuable organizers of the content. Defining concepts in terms of super ordinate concepts help to link new terms to the concepts that already exist in the learner’s cognitive structure, while the attributes or characteristics in the definitions help differentiate the term from other related concepts.

Concept definitions are most valuable to the learners when they utilize terms that are already known to them. It is rather difficult for the learner to learn a new term when it is defined with other new terms. The teacher should use Visual aids to help explain the concept (Titsworth, 2000). Concrete experiences are critical for students when relatively learned material is being reviewed. The teacher while planning must allow time required to teach concepts. Concepts may also be taught by joining them into groups to form generalizations. They are related and possess common characteristics (Markle and Tiemann, 1969) and may be joined together through a causal or correlated links (Martin, 1970).
Concepts are the form of data that results from the categorization of a number of observations. Concept formation occurs when members of a category are grouped together and then abstracted in the sense that similarities are noted and differences ignored. On the basis of these similarities, a rule for class inclusion is formed and conceptualization takes place. It is an idea that is the result of abstraction from all the concrete experiences the learner has had in his cognitive structure.

Concept is a class of stimuli that have common characteristics (DeCecco, 1968). They are formed to help the learner describe and understand the environment. The categories that are formed are based upon those characteristics and attributes which are similar and are essential to a particular classification (Smith, 1975). Concepts are coding systems, which we use to classify the stimuli from the world around us (Farnham – Diggory, 1972).

In concept learning, generalizing occurs when an individual makes the same response to different things (Eggen, Kauchak and Harder, 1979). When teaching concepts to students, certain aspects of concepts have proven more valuable than others. These are concept name, concept definition and characteristics.

**Concept name** is the word used to symbolize the given concept. This name however, may not be synonymous with the concept itself. A concept is an idea or abstraction that exists in the learner’s minds, while the concept name is the word that we arbitrarily use to designate the concept. A concept name is an arbitrary symbol, which is not a concept in itself.

The symbol allows the learner to communicate with others. A concept is an abstraction that results when the learner processes information from his experiences (Wells, 1999). This abstraction is quite oftenly linked to the symbols as shown in Figure 1.4 below:

**Figure 1.4**

Processing of Information

- Experience 1
- Experience 2
- Experience 3

Arrows indicate the flow of information:
- From Experience 1 to Abstraction
- From Experience 2 to Abstraction
- From Experience 3 to Abstraction

Abstraction to Symbol (Concept)
The child learns the concept first and later learns to attach the name to the concept. Concepts should be learned as meaningful abstractions rather than as names. Concept use and concept formation both form an integral part of generalization.

**GENERALIZATION:**

The process of generalization is expressed as a general proposition, and is a process whereby, the mind goes beyond the formation immediately available (Bruner, 1964). Going beyond the immediate information is the most important distinctive feature of the process of generalization. It is made possible by the learned probability judgements on interventional weightings to be given to different parts of the available evidence. If such probability judgements are not distinctive features of the recognition of something, then the process is not generalization, but simply that of remembering (Bruner, 1964). This is because, the mind seldom waits for all the evidence before it infers identity or forms a set of specifications.

When using generalizations as advance organizers, teachers must be certain that each of the concepts in generalization is understood thoroughly by the learners. Generalizations therefore have the abilities to summarize large amounts of information. Thus, advance organizers are effective in the way in which they provide cognitive road-maps for materials which follow generalizations. This is because of their summarizing nature which are maximally effective. The effectiveness of generalization as advance organizers can also be seen in the way in which they link new materials with the materials already learned. Whenever generalizations include concepts already familiar to the students, they usually become effective. The functioning of the organizer is to provide ideational scaffolding for the stable incorporation and retention of the differentiated material that will follow the lesson (Eggen, Kauchak, and Harder, 1979; Heinich, Molenda and Russel, 1989; 1993; Witiw, 1997).

**Main Features of Generalizations:**

- **Available Evidence of Distinctive Probability Judgements:**
  - The process of generalization goes beyond the immediate information following the available evidence of the learned distinctive probability judgements.
Concept Use and Concept Formation:

- Generalization is an integral part of both concept use and concept formation. The mind seldom waits for all the evidence before it forms a set of specifications (Bruner, 1964). Concepts when joined together form generalization. They are related and possess common characteristics (Markle and Tiemann, 1969). They may also be joined together through causal or correlated links (Martin, 1970).

Summary of Information:

- Generalizations have the ability to summarize large amounts of information or data, thereby making advance organizers to be effective in the way in which they provide cognitive road-maps for materials which follow generalizations (Ausubel, 1960; Eggen, et al., 1979; Joyce, and Weil, 1990).

Prediction:

- Generalizations are also predictive in nature for they are based upon facts which when extended, include situations not yet encountered.

Variation:

- Generalizations also vary according to the amounts of information that support and contradict them. However, some generalizations are based upon large amounts of supporting data with little or no contradictory evidence (Martin, 1970).

Generalizations are not Facts:

- The validity of generalizations are certain. But their attributes or characteristics alone, do not make them facts. (Eggen, Kauchak, and Harder, 1979).

Inclusiveness:

- Generalizations vary in terms of inclusiveness. The narrower the concepts included in a generalization, the narrower the scope of generalization. This is because the amount of information they account for are directly related to the scope of the concepts.
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- **Generalizations Vary in terms of their Scopes:**
  - Generalization may operate at different levels and magnitudes on a continuum in that some may be less inclusive by referring to a limited specific group or category of the content. This confined and restricted generalization is in a level of its own (Eggen, Kauchak, and Harder, 1979). However, for each successive generalization that may follow a concept, more and more inclusive ideas may be cited because the concept involved may be broader and larger in nature and scope than the first generalization. Other generalizations may increasingly become more broader, extensive and larger segments of reality. These in turn are based on other generalizations which again are based on facts. Hence, generalizations vary in terms of their scopes.

- **Degree of Abstractions:**
  - The degree of abstraction in some generalizations vary from one generalization to another. Hence, generalizations which are too abstract simply escape the learner's horizon and are largely ignored by the students.

**Operations of Generalization as Advance Organizers:**

- Generalization as advance organizer may operate by first breaking down the concept or generalization into subordinate concepts or components and present them in structural outlines in hierarchical forms (Eggen et al., 1979; Joyce, and Weil, 1990; Wells, 1999; West and Wolff, 2001).

- Generalization also involves the use of progressive differentiation which is the process of breaking down broad ideas into narrower and less inclusive ideas. In each of Assubel lesson, the outline is developed by comparing its components in terms of similarities and differences. This process of differentiation is termed as progressive differentiation because in it, concepts are continually or progressively divided into sub-concepts until the lesson is completed.

- Generalization also operates in the form of integrative reconciliation. This process helps the students to understand ideas.
The term integrative reconciliation arises from the function this process serves i.e. Integrative because major ideas or concepts are related to each other through reconciliation because, the differences or inconsistencies in the new material are resolved.

The desired learning outcomes of the process of integrative reconciliation is a unified body of knowledge in which relationships are noted and differences or anomalies recognized.

**Objectives of Generalizations as Advance Organizers:**

Both concept use and concept formation together form generalization. Writing objectives for generalization is the same as writing the objectives for concepts. Objectives for generalization may operate at three different levels as shown below in Table 1.1.

<table>
<thead>
<tr>
<th>Levels of Generalizations</th>
<th>Expected Behaviour or (Learning Outcomes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>♦ Knowledge</td>
<td>♦ Students recall and remember generalization</td>
</tr>
<tr>
<td>♦ Comprehension</td>
<td>♦ Students understand generalizations. They can paraphrase it and identify situations to which it is applicable.</td>
</tr>
<tr>
<td>♦ Application</td>
<td>♦ Students can use generalization to solve problems.</td>
</tr>
</tbody>
</table>

**Uses of Generalization:**

Concepts may be taught by joining them together into groups to form generalizations, thereby making advance organizers more effective in the way in which they provide cognitive road maps for materials (concepts) which follow generalizations.

Generalizations are the integral parts of both concept use and concept formation.

Generalizations summarize data or large amounts of information, which infact, are maximally effective.

Generalizations allow the learners to explain a phenomena or events which link new materials with the old materials already learned.
Generalizations are also used as examples where students are encouraged to provide examples.

**ANALOGY AS ADVANCE ORGANIZER:**

Analogy is the type of advance organizer which is quite effective in linking previously learned material with the new one. It is considered to be the most effective type of advance organizer termed by Ausubel, (1963) as a Comparative Advance Organizer. The effectiveness of analogies as advance organizers may be seen in the way in which they can be customized to fit the background of a particular student population (Wolfgang, 1996).

The correct use of analogy as advance organizer can contribute to improved understanding of scientific concepts; but inappropriate use can foster ideas that are different from accepted scientific beliefs (Venville, Grady, Treagust and David, 1997) and deep seated analogies can profoundly affect the way research findings are interpreted (Heinich, Molenda and Russel, 1989; Mash, 1990). Even research results that are true can produce false conclusions if examined through the mental fitter of a flawed analogy (Baker, and Keith, 1998; Pittman and Kim, 1999).

Analogies should therefore be based on their greater familiarity to the students. This is, when, their values will be meaningful to them. The values of Analogy as advance organizer depends upon two issues:

- The familiarity of analogy to the students and,
- The degree of overlap between the ideas to be taught and the analogy used.

**Using Analogy as Advance Organizers:**

- When using analogy as advance organizer, the areas of overlap could serve as conceptual framework and anchors for new materials to be learned. This will encourage the students to use the organizer as a reference point making analogy look similar to the mnemonic device used to remember desired information (Pittman and Kim, 1999). Hence the more familiar the analogy, the easier it will be to use for retrieving information.
Advance organizers analogies are potentially more appealing and motivating to students than concept definitions or generalizations because they can be clearly designed and stated.

When fully planned, analogies may provoke interests and add a measure of humour to the activity, which is an advantage in any learning environment (Venville, Grady, Tregust and David, 1997; Baker and Keith, 1998; Britton, 1999).

Using Extended Analogy as Advance Organizer:

The comparisons must be made familiar to the students to provide them with familiar material on which to analyze the new material being learned. The three ways of imposing structure on the content are:

- **Through the analysis of concepts:**
  - this can be done through the process of subordinate, co-ordinate and super-ordinate relationships and may be used to organize the content as well as the Lesson (Heywood, 1997).

- **Through the use of interrelated generalizations and**

- **Use of extended analogy:**
  - using analogy as advance organizer in a lesson has several advantages in that, analogy can be designed in such a way that comparisons made are familiar to students. This provides students with familiar materials to anchor the new material being learned. Analogies provide convenient ways of organizing the material for a later use (Heywood, 1997). Organizing material is an important factor in determining how much will be recalled at a later date. The purpose of structural outlines is to help students learn more from the presented material. It is always designed to promote learning. The values of structural outlines are measured by the degrees to which they help students learn and retain materials. Tables 1.2 and Table 1.3 shows the similarities and differences between Generalization and analogy.
Table 1.2

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Generalization</th>
<th>Analogy</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Generalization links new materials with materials already learned.</td>
<td>Analogy is quite effective in linking previously learned material with the new one.</td>
</tr>
<tr>
<td>2.</td>
<td>Have the ability to summarize large amounts of information, which is maximally effective.</td>
<td>Effective in the way in which they can be customized to fit the background of a particular student population.</td>
</tr>
<tr>
<td>3.</td>
<td>Generalizations become effective when they include concepts already familiar to the students.</td>
<td>The more familiar the analogy, the easier, it will be to use in retrieving information for this will help it to be similar to the mnemonic device used to remember desired information.</td>
</tr>
<tr>
<td>4.</td>
<td>Its function is to provide ideational scaffolding for stable incorporation and retention of the differentiated materials that follow the Lesson.</td>
<td>Extended analogies provide convenient ways of organizing materials for a later use. This could be done through structural outlines (hierarchies).</td>
</tr>
<tr>
<td>5.</td>
<td>When students are familiar with the Lesson being discussed, the teacher may go ahead to ask examples for further class discussions.</td>
<td>When they are relatively unfamiliar with the material teacher to provide some examples and allow students to relate them with the concepts.</td>
</tr>
<tr>
<td>6.</td>
<td>Generalization uses the process of progressive differentiation and the process of integrative reconciliation.</td>
<td>Analogy uses the processes of integrative reconciliation in breaking down broad ideas into narrower and less inclusive ones and help students understand the ideas by pointing out their similarities and differences between concepts and their relationships.</td>
</tr>
<tr>
<td>7.</td>
<td>If generalization is not understood well by students, the teacher prepare lessons and examples, for further explanations based on the students' Entry Behaviour.</td>
<td>Analogies come in the aid of generalizations by providing examples in hierarchical order and extended hierarchy. Hence analogies use sub-sumptive sequencing to help explain generalization.</td>
</tr>
</tbody>
</table>

Table 1.3

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Generalization</th>
<th>Analogy</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Some generalizations are too abstract to be meaningful making their utility to students questionable, hence meaningless;</td>
<td>As advance organizers, analogies are potentially more appealing and motivating to students than generalizations or concept definitions.</td>
</tr>
<tr>
<td>2.</td>
<td>When being used as advance organizer, the teacher must be sure that each concept in generalization is understood thoroughly by the learners.</td>
<td>When fully planned, analogies may provoke interests and add a measure of humour to the activity, which is an added advantage in a learning environment.</td>
</tr>
<tr>
<td>3.</td>
<td>Generalizations, which are too abstract, simply escape the learners' horizons; hence generalizations vary in-terms of their scopes.</td>
<td>Analogies use sub-sumptive sequencing i.e. arranging material to be taught in a hierarchical relationship to assimilate new knowledge and skill in the learner's cognitive structure.</td>
</tr>
</tbody>
</table>
IMPLEMENTATION OF THE AUSUBEL MODEL THROUGH ADVANCE ORGANIZERS:

Implementing Ausubel's Model involves the use of certain characteristics in an Ausubel Lesson. The lesson begins with the presentation of an advance organizer. This is followed by the major and more encompassing ideas, which are then progressively differentiated into sub-topics. This is followed by the use of an overhead projector (OHP) for frequent classroom references by providing direction for the lesson and reminding students of the Lesson's central focus. The differentiated topics are then related through the process of integrative reconciliation.

**Progressive Differentiation:**

This is the process by which ideas are broken down or elaborated into more complex ideas. In progressive differentiation, the most general ideas of the discipline are presented first, followed by a gradual increase in detail and specificity (Ausubel, 1968; Eggen, Kauchak and Harder, 1979). The process of sequentially breaking down ideas depicts how the learners' progressive differentiation came about. And the process of cognitive growth or development of a human mind can best be discussed in terms of progressive differentiation or the formation of increasingly complex cognitive structure. The variation of the Ausubel Model showing a graphical solution in the form of structural outlines or hierarchy has been placed in Figure 1.4 below:

**Figure 1.5**

**Variations of the Model**

The Ausubel Model

- Planning Ausubel Activities
- Implementing Ausubel Activities
- Evaluation of Ausubel Activities

- Presentation of Advance Organizer
- Progressive Differentiation
- Integrative Reconciliation
- Variations of the Model

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Different Levels of Progressive Differentiation:

Progressive differentiation is a life long learning process, which occurs as individual's knowledge as the world becomes increasingly complex. It is a procedure used in teaching to break ideas down into other ideas. This is done typically through verbal means, telling and questioning. It is a process that students learn through interaction with the teacher. Students can use this process in future learning to further develop or differentiate their cognitive structure.

How to Present and Teach Lessons Using Progressive Differentiation:

When utilizing progressive differentiation in the classroom, the teacher should:

- Present the differentiation of the concepts in the lesson graphically,
- Present the material in structural outlines or hierarchies.
- When presenting the hierarchies, the teacher should present the differentiated structure sequentially rather than at once by adding the elements bit by bit as being discussed in the class. Presenting differentiated hierarchy in parts help focus students' attention on the topic immediately at hand;
- Partially differentiated hierarchies involve the differentiation of two concepts followed by sub-concepts.
- Depending upon the background of the students; differentiation process may assume two ways:
  - If students are some-what familiar with the material being discussed, the teacher may go ahead to ask examples from the familiar concepts.
  - When students are relatively unfamiliar with the material to be covered, the teacher can provide some examples and in the process ask students to relate the examples to the concepts being considered and the other examples as well.

One important attribute of progressive differentiation is that the teacher should involve children in the Lesson and keep on checking their understanding abilities as much as possible. This gives the teacher a better judgement of either relating the concepts through integrative reconciliation by comparing and
contrasting ideas as they are presented or to continue with progressive
differentiation until the broadest concept has been completely sub-divided.

*Progressive Differentiation Showing Different Hierarchies Involving
  Generalizations:*

Progressive differentiation can also involve breaking generalization down
into less inclusive and more specific generalizations. It may also be presented
using concept generalizations and examples of the familiar concepts.

Differentiating items in an Ausubel lesson therefore help the teacher to
present differentiated materials with structural outlines. Various researches have
shown that visual outlines help students remember the relationships symbolized
in the outlines and hierarchical cues helped students to understand the
underlying organization of prose materials (DiVesta, 1977; Eggen et al; 1979).
The outlines therefore serve as shorthand pictorial representation of materials to
be remembered (DiVesta, 1977).

Thus, progressive differentiation is the setting apart of each concept or
generalization within the hierarchy of knowledge being presented so that it can
be learned as an independent piece of knowledge. Differentiating contents
ensure that the separate parts of the concept being taught are learned as
discrete but related entities in a meaningful manner.

*Integrative Reconciliation:*

In an integrative reconciliation, new ideas should be continuously related
to previously learned content. Each successive learning is carefully related to
what has been learned before. Both these two principles require the learner’s
active cooperation. They are intended to increase the discriminability, clarity and
stability of the new learning material. Active reception learning (ARL) is intended
to bring about the learner’s involvement in expository teaching (Pittman and
Kim, 1999). Ausubel’s concept of active reception learning (ARL) includes the
basic skills of critical thinking.

Integrative reconciliation is another way, which can help the teacher know
whether or not the content taught is learned in a meaningful way (Ausubel,
1978). To avoid rote memorization, the teacher using Ausubel model uses
integrative reconciliation at each stage in the structural hierarchy. Any technique
that a teacher uses permanently to ensure that all parts of the hierarchy are
related in one way or the other may be considered as appropriate means of accomplishing this process.

The term Integrative reconciliation therefore, refers to an explicit attempt by the teacher to help students determine significant similarities and differences between facts, concepts, and generalizations, and to reconcile real and apparent inconsistencies between ideas presented and incorporate them into their cognitive structures. The process of integrative reconciliation is therefore the reciprocal of the process of progressive differentiation. It consists of a detailed analysis of the similarities and differences between concepts or generalizations. Integrative reconciliation may be done after a concept or generalization is completely differentiated into the first level of subordinate concepts. Integrative reconciliation may take place through questioning or may be accomplished in an expository manner by the teacher. The process exists at every level in the hierarchy and includes reference to advance organizer. Table 1.4 below shows the differences between progressive differentiation and integrative reconciliation.

Table 1.4
Differences Between Progressive Differentiation and Integrative Reconciliation

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Progressive differentiation</th>
<th>Integrative reconciliation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>The main emphasis is on breaking down major ideas into their components.</td>
<td>Emphasizes the relationship between major ideas as well as their relationship with the advance organizer.</td>
</tr>
<tr>
<td>2.</td>
<td>Its purpose is to help students discriminate new or additional information from the old ones.</td>
<td>The purpose is to ensure that new ideas are learned as part of a coherent whole rather than in single disjointed ideas.</td>
</tr>
</tbody>
</table>

Purpose of Integrative Reconciliation:

- The basic purpose of integrative reconciliation is to ensure that the material to be learned is comprehended in a meaningful manner.
- Any technique that a teacher uses to ensure that all parts of the hierarchy are related in some manner is considered appropriate means of accomplishing this process.
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With the availability of either of the two options (Progressive differentiation and Integrative Reconciliation), the task of the teacher is to explore the relationships among the differentiated concepts (Joyce, and Weil, 1990). The model's strength therefore lies in its ability to relate individual daily lessons into a cohesive whole, thereby enabling students to see the coherent whole rather than as single, disjointed ideas.

Planning for Ausubel Activities:

When planning a lesson, the teacher must first, state the lesson's goals, objectives and the students' background (Entry Behaviour),

- Whenever the ideas to be taught are already familiar to the students, one primary focus of the lesson will be to analyze similarities, relationships, and differences in the material by allowing students to provide examples,

- If the concepts or generalizations are not understood, the teacher must prepare examples and spend time in teaching the concepts and generalizations themselves. This should take place structurally or hierarchically,

- The teacher then organizes the material in structural outlines (Hierarchy),

- The final part is for the teacher to prepare the advance organizer, which can take the form of concept definition, generalization or analogy,

- The teacher must be aware of the content background of the students. Effective use of the model is dependent upon a teacher's sensitivity to the background experiences and cognitive structure of the students.

Planning an Ausubel Lesson therefore involves the following:

- Setting up the objectives and scope of the Lesson first,
- Determining which material to be covered in the Lesson,
- Specification of the students' background and the nature of the material to be presented,
- If students already comprehend the concepts or generalizations, the lesson will be devoted to comparing the abstractions. But if generalizations are not understood, then, the teacher will have to prepare lessons and samples after considering the students' background and deciding on the materials to be covered. The teacher then, organizes the material in structural outlines or (hierarchies).
THE AUSUBEL LESSON (A THEORETICAL FRAME WORK):

➢ An Ausubel Lesson begins with a statement called advance organizer (Ausubel, 1960). This statement is designed to introduce the materials that follow the other and is broad enough to encompass the information. The Lesson is designed to teach organized bodies of content containing numerous concepts or generalizations.

➢ In the course of an Ausubel lesson, the teacher helps students break major ideas down into smaller related ideas. To ensure that these new ideas are retained, and are connected to existing cognitive structures, the teacher helps students determine the relationship between the new ideas and the old ones among the new ideas themselves. The lesson should be interactive so those students can learn to develop their own ideas and process their own information. These can be done if characteristics in the lesson are critically followed.

Characteristics of an Ausubel Lesson:

The lesson has a number of characteristics to guide the organization of content in the subject fields so that the concepts become a stable part of the student’s cognitive structure and to describe the student’s intellectual roles. These characteristics are:

➢ The principle of Progressive Differentiation.
➢ The Principle of Integrative Reconciliation.
➢ Deductiveness, with broader, and more inclusive ideas presented first, and
➢ The Model Uses Exemplars.

Situations in which the Teacher will have to Impose Structure on Previously Unstructured Material:

The purpose of structural outlines is to help students learn more from the presented material. It is designed to enhance learning, so that an arbitrary structure is completely legitimized. The value of such structural organizations is measured by the degree to which they help students learn and retain material. Ways in which structure can be imposed on the content in the absence of unifying themes are:
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✔ **Analysis of Concepts:**

The process of analyzing, subordinate, coordinate, and super-ordinate relationships, which can be used to organize the contents as well as the lessons, are established.

✔ **Interrelated Generalizations:**

The use of interrelated generalizations is also helpful where it is followed by a number of examples grouped into topical areas by breaking them down into subordinate, narrower and less inclusive generalizations.

✔ **Extended Analogy:**

The use of extended analogy to organize an Ausubel's lesson is important because, analogy may be designed in such a way that the comparisons made are familiar to students. This provides the students with familiar material on which to anchor the new material learned. Analogies also provide convenient way of organizing materials for later use.

**Components of the Ausubel Model:**

The Ausubel model comprises of the following components:

✔ **Syntax:** This is the first phase of an Ausubel activity. It involves the presentation of the organizer, which is more general than the material that follows.

✔ **Presentation:** This is the second phase of the component. Presentation itself should be hierarchically more abstract than the succeeding ones in any sequence of learning activities in an Ausubel lesson. An abstract of ideas should be presented and should precede the material rather than later being discovered by the learner who has analysed the material.

✔ **Social System:** The social system is a structured one and the teacher is the initiator and controller of norms (Joyce and Weil, 1972). The teacher retains control of the intellectual structure and continues to relate learning material to the organizers to help students discriminate new material and differentiate from previous material.

✔ **Principles of Reaction:** During the lesson, the teacher continues to guide the students by pointing out the conceptual anchorage for the material and helps the learners to see the relationship between the
material being presented and the organizer. The teacher is the controller of the learning situations.

- **Support System:** The advance organizer depends on an integral relationship between the conceptual organizer and the rest of the content. A detailed discussion on the Ausubel Model is in Chapter II of this study.

### COGNITIVE STYLE

This is a broad dimension of individual differences that extends across both perceptual and intellectual activities. Cognition covers various modes of knowing, perceiving, imagining, remembering, conceiving, judging and reasoning. The term *style* is used because, what is at issue is the characteristic approach the individual brings with him to a wide range of situations. Since cognitive approach covers both perceptual and intellectual activities, it is then referred to as the learner’s **cognitive style**.

Cognitive styles therefore refer to the modes an individual employs in perceiving, organizing and labeling various dimensions of his environment. It reflects various consistencies in the manner or form of cognition, which are distinct from the content of cognition or the level of cognitive skills displayed. Cognitive style refers to the preferred ways that different individuals have for processing and organizing information and for responding to environmental stimuli. Certain individuals tend to respond very quickly in most situations (**impulsive cognitive style**), whereas others are more reflective and slower to respond (**reflective cognitive style**). Even though both types of individuals are equally knowledgeable about the task at hand, cognitive styles suggest that individuals approach the same task in different ways. These variations don’t reflect levels of intelligence or patterns of general abilities.

Each individual has preferred ways of organizing all that he sees, remembers, and thinks about. Consistent individual differences in these ways of organising and processing information and experiences have come to be called as cognitive styles. These styles represent consistencies in the manner or form of cognition or level of skills displayed in the cognitive performance. Cognitive Styles are conceptualised as stable attitudes, preferences or habitual strategies determining a person’s typical modes of perceiving, receiving, remembering, thinking and problem Solving (**Hilgard and Bower, 1986**). Cognitive style may
also entail generalized habits of information processing, to be sure, but they develop in congenial ways a round underlying personality trends.

Thus, cognitive styles are intimately interwoven with affective temperamental and motivational structures as part of the total personality. Cognitive styles and learning styles is one thing, which has been used interchangeably by psychologists and educators (Bjorklund, 1989; Woolfolk, 1993). Educators prefer to use the term learning styles and include many kinds of differences in this broad category. On the other hand, psychologists tend to prefer the term cognitive styles and to limit their discussion to differences in the ways people process information.

The notion of cognitive styles is fairly new. It grew out of research on how people perceive and organize information from the world around them. Results from these studies suggest that individuals differ on how they approach a task, but these variations do not reflect levels of intelligence or patterns of special abilities. Instead, they have to do with preferred ways that different individuals have for processing and organizing information and for responding to environmental stimuli (Shuell, 1981a). This means that certain individuals respond very quickly in most situations. Others are more reflective and slower to respond, even though both types of people may be equally knowledgeable about the task at hand (Woolfolk, 1993).

Cognitive styles are styles of thinking probably influenced by and in turn influence cognitive abilities (Brodzinsky, 1982). They are styles often described as falling on the borderline between mental abilities and personality traits (Shuell, 1981a). But these preferred ways of dealing with the world also affect social relationships and personal qualities. Students approach problems in different ways. Some may need help learning to pick out important features and to ignore irrelevant details. They may seem lost in less-structured situations and need clear, step-by-step instructions. However, other students may be great at organizing but less sensitive to the feelings of others and not as effective in social situation (Garger and Guild, 1984; Pandey and Agarwal, 1997).

VARIOUS TYPES OF COGNITIVE STYLE:

Some types of cognitive styles are:

i) Field Dependence and Field Independence;

ii) Impulsive and Reflective Cognitive style;
iii) Individualistic vs. Non-individualistic;
iv) Motivation centred vs. Non-motivation centred;
v) Aural vs. Visual;
vi) Environment oriented vs. Environment free;
vii) Flexible vs. Non-flexible;
viii) Responsible vs. Irresponsible.

i) Field Dependence and Field Independence:

One main example of cognitive style which may help clarify the factor of these stylistic dimensions and their pervasive involvement in learning, thinking and social interaction is the Field-Dependence and Field-Independence.

Field Dependence and Field-Independence refers to consistent mode of approaching the environment in an analytical manner as opposed to global terms. It is viewed as the manifestation in perception of more generally articulated versus global cognitive style in itself is reflective of still broader dimensions of psychological differentiation (Witkin et al., 1962). Witkin et al. (1954); Karp (1963); Witkin and Oltman (1975) stated that, field independent group achieved a higher level of differentiation than field dependent groups as identified by Embedded Figure Test (EFT) and Rod and Frame Test (RFT). Field independent individuals have more facility in tasks requiring differentiation and analysis whether in identifying more easily the presence of logical errors or in understanding more quickly, the point of joke and this analytical penchant leads to a high degree of differentiation of the self-from its contents (Witkin, Dyke, Goodenough and Kerp, 1962). Field-Independent persons tend to articulate figures as discrete from their backgrounds and to easily differentiate objects from embedding contexts. Whereas the field-dependent person tends to experience events globally in an undifferentiated fashion.

ii) Impulsive and Reflective Cognitive Styles:

Apart from Field-Dependent vs Field-Independent, Impulsive versus Reflective form another aspect of cognitive style. An impulsive student works very quickly but makes many mistakes. The more reflective student on the other hand, works slowly and makes few errors. As with field-dependence/independence, impulsive and reflective cognitive styles are not highly related to intelligence within the normal range. However, as children grow older, they
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generally become more reflective, and for school age children being more reflective does seem to improve performance on school tasks such as reading (Kogan, 1983; Smith and Caplan, 1988).

On the other hand, field-dependent or (global) individuals tend to identify with a group exhibiting a social orientation in which they are more perceptive and sensitive to social characteristics such as names, and faces than are field independent persons. Researchers have also found that field dependent groups are more susceptible to external influences and more markedly affected by isolation from other people (Witkin, Dyk, Fatenson, Goodenough and Kerp, 1962; Messick, 1972).

iii) Individualistic vs. Non-individualistic:

Students who enjoy working on their own on the educational task have been described as having individualistic learning style. Whereas others who prefer carrying out any educational task with a group or in a team have been characterized as having non-individualistic learning style.

iv) Motivation centred vs Non-motivation centred:

Students who are eager to learn more and more; are enthusiastic about exploiting the learning situations, they are more conscious about demonstrating their best to get high grade, praise etc for their performance, have been characterized as having motivation centred learning style. Students with contrary characteristics have been taken as having non-motivation centred learning style.

v) Aural vs Visual:

Students who depend on printed or written material or the like for learning have been classified as having visual learning style. Others who learn best when they hear human voice directly or indirectly have been named as having aural learning style.

vi) Environment oriented vs. Environment free:

Students, if affected by physical environment like heat, sound, light while studying have been identified as having environment oriented learning style. On the other hand, students whose learning is not affected by any type of physical environment have been labeled as having environment free learning style.
vii) **Flexible vs. Non-flexible:**

Students who are not satisfied with the traditionally accepted solution to a learning problem and always try to arrive at unique responses and solutions have been identified as having flexible learning style. Students who are satisfied with traditionally accepted response to a learning solution have been characterized as having non-flexible learning style.

viii) **Responsible vs. Irresponsible:**

When given a learning task, responsible students invariably complete in at the first instance and often do so without direct or frequent supervisions. Those students who seldom complete their learning task in time and that too with direct or frequent supervisions, have been classified as having irresponsible learning style.

Although cognitive styles are viewed by different scholars as habitual modes of information processing, (Kogan and Kogan, 1970, 1971) they are not simple habits in the technical sense of learning theory for they are not directly responsive to principles of acquisition and extinction. They develop slowly and experientially, and do not appear to be easily modified by specific tuition or training (Kogan and Kogan, 1970, 1971). Cognitive styles can therefore be differentiated in two ways. Those which are high level heuristics that organize and control behaviour across a wider variety of situations and cognitive strategies which are decision making regularities in information processing that at least in part are a function of the condition of particular solutions (Bruner, Good and Austin, 1956; and Show, 1970).

Accordingly, some examples of cognitive strategies include, the use of organising mediators (such as meaningful groupings in serial learning and use of holist and partist hypotheses testing strategies in concept attainment, (Fredriksen, 1969; Goodenough, 1976). Cognitive strategies are therefore selected, organized and controlled in part as a function of larger-scale, more general cognitive styles and ability patterns, but they are also determined in part as a function of task requirements, problem content and situational constraints. Hence, in comparison to styles, strategies are likely to be more amenable to change through training under varied conditions of learning. It may be possible for the individuals to learn to use options, problem solving and learning.
strategies consonant with their cognitive styles and even to learn to shift to less congenial strategies that are more effective for particular task than are their preferred ones.

Thus, cognitive styles are intimately interwoven with effective temperamental and motivational structures as part of the total personality. They provide one aspect of the matrix that determines the nature or form of adaptive traits, defence mechanisms and pathological symptoms (Shapiro, 1965). According to Piaget, (1970), there are two aspects of the human mind i.e.:

i) The cognitive structure, and

ii) The cognitive functioning.

The initial cognitive structure of infants is supposed to incorporate only those cognitive abilities or potentials, which help them to do such acts as look, reach out, or grasp (Piaget, 1970). These abilities are termed as schema (Piaget, 1970). Tolman, E.C. (1932), stated that cognitive style is a potential variable affecting the student’s academic choices and vocational preferences, his continuing academic development, how students learn, how teachers teach and how students and teachers interact in the classroom. All contribute to cognitive styles.

In the above viewpoints, a core of personality structures are manifested in the various levels and domains of psychological functioning, intellectual, affective, motivational, defensive and their manifestation in cognition. These are termed as cognitive styles (Adorno, Frenkel-Brunswik, Levinson and Sanford, 1950). It covers all the various modes of knowing, perception, imagination, remembering, conceiving, judgement and reasoning (Denver, 1952). It functions as an ultimate mode or aspect of the conscious life and is contrasted with the effectiveness or connative feelings and willingness and is primarily connected with aspects of thought that have been largely separated from the emotional aspects of knowledge. Cognitive style is concerned with the process of gaining information and understanding of the world through personal experience (Goods, 1959). Such terms as sensation, perception, imagination, retention, recalling, problem solving, and thinking etc are all aspects of cognition (Nice, 1967). To Bloom, (1956), cognitive domain includes all those objectives which deepen with recall or recognition of knowledge and with the development of intellectual abilities and skills. Cognitive style therefore dictates the cues that
the individual will use, but not necessarily the level in which his intelligence functions (Kogan and Block, 1991). It is therefore worth to state that cognitive psychology studies man’s thinking, memory, language, development, perception, imagery and other mental processes. The human mind (probably) does not accept information from its environment in exactly the form and style in which it is conveyed. The conveyed information is compared with the information already stored in the mind (Kogan and Block, 1991; Willie, 1997). The information is then analysed; enlarged upon; given new form and finally, it is subjected to interpretation and then used or stored according to the need of the time. According to cognitive psychologists whatever is conveyed through the stimulus in the environment is the input. The cognitive functioning of the human mind is the process and the result of the cognitive functioning is the output or product (Hilgard, and Bower, 1986). It is therefore the consistent individual differences that mediate between environmental input and the organismic output.

SELF ESTEEM

Self-esteem is a person’s evaluation of his own self-worth. It is an element of the internal system that we all bring to any interpersonal communication situation (Bodaken, 1975). Self-esteem refers to an individual’s perception of his own self-worth, his feelings of self-respect, and self-confidence. And it is all other extent to which people hold positive or negative views about themselves (Brockener, 1988). It is the value each of us places on our own characteristics, abilities and behaviours (Woolfolk, 1993).

If people have positive self-concepts – If they like what they see in themselves – we say that they have high self-esteem (Reynolds, 1980; Metcalfe, 1981; Shavelson and Bolus, 1982; Harter, 1990; Marsh, 1990; Woolfolk, 1993). The terms often are used interchangeably even though they have distinctive meanings. People differ in the degree to which they like or dislike themselves. This trait is called self-esteem (Brockener, 1988). The amount of self-esteem that people have accounts for much of their behaviour in the organization and their life in general.

In Maslow’s (1939) hierarchy of needs, which is met by the individual’s interaction with the environment, esteem needs were ranked second in the apex (Combs, 1962; Sarah, 1977). One aspect of esteem is self-esteem, which is
positive when we meet our standards for achievement. We feel good about ourselves when we are confident that we can master our chosen tasks in life. We also feel good when we gain the respect of others for what we do. We rely on others for prestige, status, recognition, and reputation. However, when we cannot fulfil our esteem needs, we feel a sense of inferiority, helplessness, and discouraged (Sarah, 1977).

A sense of competence is the result of repeated experiences of positive feedback (Sarah, 1977). Each activity–feedback sequence in our life contributes its outcome to the rest; its result serves as a set for other encounters with aspiration and it becomes part of our self-image (Sarah, 1977; Ellis and Taylor, 1983).

Common sense suggests that those who have positive self-esteem are likely to lead satisfying lives while those who do not, are just likely to find life dissatisfying and unhappy (Beane, 1993). Just like many other commonsensical things, the idea of self-esteem has become a source of considerable controversy and contention in the school context.

In the early 1990’s controversial debates emerged whether schools ought to try to enhance self-esteem, and if so, how, on what grounds, and to what extent? That the school might play a role in the development of self-esteem is not a recent idea. It has been part of the educational thinking for most of the past century, particularly since 1960’s when many educators came to realize that affect in general and self-esteem specifically is prevalent in school life. But it was in 1980’s that self-esteem was introduced into educational policy thinking. It became linked not only to academic achievement, but also to substance abuse, antisocial acts, adolescent pregnancy, suicide, and other self-destructive behaviours.

The theory then was that: People, including the young, will not hurt themselves if they like themselves. Moreover, if they have self-confidence, they are more likely to do well at whatever they might try to do (California Task Force to Promote Self-Esteem and Personal and Social Responsibility, 1990). Thus, self-esteem is our evaluation of our own self-concept (Woolfolk, 1993).
Various psychologists have studied and discussed conceit (egotism, or self-esteem) which in fact constitutes an important aspect of personality. The conceited individual perceives himself as being superior to others in one, many or all aspects (Stagner, 1937; Stagner, 1948; Sarah, 1977; Woolfolk, 1993).

The development of self-esteem of the child is influenced by parents and other family members in the early years and by friends, schoolmates, and teachers as the child grows. Before about age 7 (seven), children tend to see themselves in global terms – if they have a positive self-esteem, they assume that they are good in all areas of performance (Harter, 1990). But as they mature, children's views of themselves become more differentiated; that is, multiple esteems of the self-come into play as being influenced by their peers (Woolfolk, 1993). The self-esteem evolves through constant self-evaluation in different situations (Shavelson and Bolus, 1982). Children and adolescents are continually asking themselves, How am I doing? They compare their performance with their own standards and with the performance of peers. They also gauge the verbal and non-verbal reactions of significant people – parents, best friends, leaders, and teachers (Woolfolk, 1993).

When students mature, self-esteem tends to increase. Until students adjust to the new demands of high school workload, they may experience a decrease in self-esteem. But with growing competence and independence in adolescence, growth in self-esteem resumes (Powers, Hauser and Kilner, 1989). The context of school also makes a difference. Students who are strong in maths in an average school; feel better about their math skills than students of equal ability in high achieving schools. Marsh and Holmes (1990) call this the Big-Fish-Little-Pond-Effect. In order to build self-esteem, the individuals must explain their success or failure. We must attribute success to our own actions, not to luck or to special assistance (Woolfolk, 1993). While researching the antecedents of self-esteem, Stanley and Coopersmith believed that high self-esteem results from parental acceptance, the setting of limits, and freedom for individual action within those limits (Coopersmith, 1967; 1981). A child whose parents establish clearly and enforce limits have advantage for evaluating performance (Sarah, 1977).
James (1992) constructed what might well be called Jame’s Law concerning levels of self-esteem. As James succintly puts it:

\[
\text{Self-Esteem} = \frac{\text{Success}}{\text{Pretensions}}
\]

Jame’s (1992) formulation of the law pointed out the importance of the person’s aspirations and the outcomes of his behaviour in determining levels of self-esteem. Hence, our feelings in this world depend entirely on what we back ourselves to be and to do. It is determined by the ratio of our actualities to our supposed potentialities, a fraction of which our pretensions are the denominators and the numerator of our success as stated above.

Such a fraction may be increased as well by diminishing the denominator as by increasing the numerator (Gordon and Gergen, 1968). It is a consistent feature of human personality that it tends to become organized about the main problems of adaptation and this main problem tends to polarize all the aspects of adaptation towards itself.

The problem adaptation may be oriented toward the discrimination one suffers and the consequences of this discrimination for the self-referential aspects of his social orientation. This means that his self-esteem suffers (which is self-referential) because he is constantly receiving an unpleasant image of himself from behaviour of others to him Kardiner and Ovesey, (1951).

This leads to the development of subjective impact of social discrimination leading to ever-present unrelieved irritant on the respondent to the influence of irritability on the respondent. The influence of irritability leads to the development of painful intensity because the individual in order to maintain internal balance and to protect himself from being overwhelmed by it, must initiate restituitive manoeuvres in order to keep functioning (Kadiner and Ovesey, 1951; Many, 1973).

In addition to maintaining an internal balance, the individual must continue maintain a social façade and some kind of adaptation to offending stimuli so that he can preserve some social effectiveness. A typical parallelogram of forces illustrating the development of the phenomena has been placed in Figure 1.6 below.
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Figure 1.6
Forces Leading to the Development of Low Self-esteem
The Adaptational Range


All this requires a constant preoccupation, not withstanding the fact that these adaptational processes take place on a low order of awareness.
In the above figure, at the centre of the development of this low adaptational scheme stands the low self-esteem (the self-referential part) and the aggression (the reactive part). The rest are manoeuvres with these main constellations to prevent their manifestation, to deny them and the sources from which they come, to make things look different from what they are, and to replace aggressive activity, which would be socially disastrous with more acceptable ingratiation and passivity.

Keeping this system going in the minds of the individual means however:

- Being constantly ill at ease;
- Mistrustful;
- Lacking in confidence;
- Lack in the desire for reputation, prestige, worth, strength, respect, attention, appreciation and recognition;
- Which leads to feelings of inferiority, weakness, helplessness, which gives rise to basic feelings of discouragement and neurotic trends and disorders (Steers and Porter, 1975).

The entire system prevents the affectivity of the individual that might otherwise be available from asserting itself. Low self-esteem people are therefore generally poor estimators of their own ability to successfully carry out certain behaviours. They generally tend to underestimate the likelihood that they will be successful, although sometimes they are unrealistically high in their estimates.

Not surprisingly, people's self-esteem tends to be related to their expectancy performance experiences. Motivating low self-esteem people to perform well is difficult, since they are predisposed to believing that they cannot perform well (Steers and Porters, 1975, Levy, 1993). On the other hand, high self-esteem people tend to have realistic expectancy performance expectations. Thus, they respond more predictably and realistically to their environment.

Various researches conducted have shown that individuals are more confident of their behaviour, see themselves as more competent, and are more optimistic of favourable results from situations in which they find themselves (Maslow, 1939; Stagner, 1948; Bodaken, 1975; Sarah, 1977; Levy, 1993; Greenberg and Baron, 1999).
A research conducted by (Marsh, 1990) revealed that students with higher self-esteem are somewhat more likely to be successful in schools although the strength of the relationship varies greatly depending on the characteristics of the students and the research methods used (Hansford and Hattie, 1982; Marsh and Holmes, 1990).

In addition, higher self-esteem is related to more favourable attitudes towards school, more positive behaviour in the classroom and greater popularity with other students (Reynolds, 1980; Metcalfe, 1981; Cauley and Tyler, 1989).

School is a place where children develop or fail to develop a variety of competencies that come to define self and ability, where friendships with peers are nurtured, and where the role of the community member is played out, all during a highly formative period of development. Thus, the building of self-esteem, interpersonal competence, social problem solving, and leadership becomes important in its own right and as a critical underpinning of success in academic learning (Good and Weinstein, 1986).

In a recent study conducted on 322 Sixth grade students for two years (Hoge, Smit and Hanson, 1990) found that student satisfaction with the school, their sense that classes were interesting, and that teachers cared, and teacher feedback and evaluations influenced students self-esteem (Hoge, Smit and Hanson, 1990). Teachers’ feedback and grades in particular subjects affected self-concepts in those subjects. However, in physical education, teachers’ options were especially powerful in shaping students’ conceptions of their athletic abilities.

Interestingly, special programmes like student of the month, participation in the Science Olympiad or Talent Search, or admissions to advanced Math Classes had little effect on self-esteem (Hoge, Smith and Hanson, 1990).

CORRELATES OF SELF-ESTEEM:

Normally, self-esteem is considered as existing on a continuum in which people are arranged from high to very low-levels in their perceptions about themselves.

♦ Individuals high in self-esteem are more confident of their behaviour, perceive themselves to be more competent, and are more hopeful of obtaining favourable results from their efforts than individuals with low self-esteem Bodaken, (1975).
At the same time, individuals low in self-esteem appear to be unsure of themselves and exhibit a little or no confidence in ambiguous or in uncertain situations (Combs, 1962; Levy, 1993). People low in self-esteem evaluate themselves unfavourably, believing they are lacking in important respects and that they have characteristics that others consider unappealing (Greenberg, and Baron, 1999). In Contrast, people high in self-esteem evaluate themselves favourably, believing they possess many desirable traits and qualities (Greenberg and Baron, 1999). Considerable evidence suggests that such feelings affect behaviour in organization and Institutional settings (Brookner, 1988).

Other research findings revealed that people who are low in self-esteem tend to be less successful in their job searches than those who are high in self-esteem (Ellis and Tylor, 1983; Pierce, Gardner, Dunham and Cummings, 1993).

Another research conducted by Robins (1999), revealed that individuals with high-esteem will take more risks in job selection and are more likely to chose unconventional jobs than people with low self-esteem. One most generalizeable finding on self-esteem is that people with low self-esteem are more susceptible to external influence than are high self-esteem groups (Ellis, and Tylor, 1983). Low self-esteem people are dependent on the receipt of positive evaluation from others. As a result, they are more likely to seek approval from others and more prone to conform the beliefs and behaviours of those they respect than are high self-esteem groups (Robbins, 1999). Whereas in Managerial positions, Low self-esteem groups will tend to be concerned with pleasing others and therefore are less likely to take unpopular stands or decisions than are high self-esteem groups (Robbins, 1999).

Self-esteem has also been found to be related to job satisfaction. A number of studies confirm that high self-esteem groups are more satisfied with their jobs than low self-esteem groups (Brockner, 1988).

A research conducted by (Ellis and Tylor 1983) focussed on the job search behaviour of a group of seniors about to graduate from college.
Measures of their self-esteem were taken, and these were compared with evaluations by organizational recruiters who had interviewed them. Compared to candidates with high self-esteem, those with low self-esteem came across as less confident in their abilities and were less likely to receive job offers. People with low self-esteem when eventually employed, tend to be attracted to positions in larger organizations, the ones in which it is more difficult for them to be noticed, and call attention to themselves (Turban and Kenon, 1993).

Researches have shown that the lower an employee's Self-esteem, the less likely he/she is to take any active steps to solve problems confronted on the job. As a result, their performance tends to suffer (Pierce, Gardner, Dunham and Cummings, 1993). By contrast, employees with high levels of self-esteem are more inclined to actively attempt to acquire the resources needed to cope with work problems, and to use their skills and abilities to their fullest, and as a result, to perform at higher levels. (Levy, 1993).

♦ People with low self-esteem tend to be aware of their tendency to perform poorly (Levy, 1993). Researches have shown that they are predisposed to evaluate themselves quite negatively (especially when ambiguity exists concerning their performance), and to believe that they are inherently responsible for their poor performance (Levy, 1993). Low self-esteem however, is probably the most important single element leading to anxiety in an interpersonal communicating situation (Stagner, 1948; Bodaken, 1975).

♦ As might be expected, a person's level of self-esteem affects the amount of attitude change he experiences in response to persuasive messages. In general, people with low self-esteem are more easily persuaded, they change their attitudes more readily than those with strong self-esteem when receiving persuasive messages.

♦ Furthermore, people with low self-esteem conform more to group norms than those with strong self-esteem and are more susceptible to messages emphasizing social standards (Bodaken, 1975). At the same time, persons with strong self-esteem are more difficult to persuade. Their attitudes on an issue are generally harder to change (Stagner, 1948; Combs, 1962, Woolfolk, 1993). Since
they have more confidence in themselves and their opinions, they are less likely influenced by messages attempting to persuade them to change their stands on standards. The meanings that we assign to certain stimuli are directly related to the self-esteem we have (Woolfolk, 1993; Blitzer, Petersen and Rogers, 1993).

MINIMISING THE DEGREE OF FEELINGS OF LOW SELF-ESTEEM:

Brockner, and Guare, (1983) concluded that people low in self-esteem can change. Some suggestions are available which can be done on an everyday basis in an organization/Institution to help minimize the degree to which feelings of Low self-esteem may emerge (Blitzer, Petersen and Rogers, 1993). Some of these suggestions are as follows:

➢ Make people feel Uniquely Valuable

Everyone has his/her own special contributions that can be made to the company/organization/Institution, and these need to be recognized. Leaders should encourage all constructive ideas and behaviours, especially those that reflect the unique differences of individuals;

➢ Make People feel competent

It is a good idea to recognize the good things that people do and praise them accordingly. That is Catch some one in the act of doing something right. Managers who fail to credit their subordinates for their ideas and achievements miss a golden opportunity to build the self-esteem of the individuals;

➢ Make People feel secure

The less people know about what is going on in an organization, the less likely they are to understand things, and the less likely they are to know what is expected of them. Employees’ self-esteem is enhanced when managers make their expectations clear; and are forth right with them;

➢ Make People feel empowered

People who lack Power (even limited Power, such as the opportunity to choose among a list of acceptable options) will tend to suffer from low self-esteem. By contrast, employees who are given opportunities to decide how to act will feel better about themselves and their work;
Make People feel connected

It is important for people to feel that they belong to an organisation and their contribution are appreciated. It is also useful to create opportunities for people to feel accepted, even if only during social events, in which they have opportunities to make use each others’ skills and experiences.

ENHANCING SELF-ESTEEM:

The present generation is living in very complex times. This is the age of discontinuity and disbelief of ambiguity and ambivalence. The school’s role as a social agency is meant to contribute to the general health and well being of young people (Mecca, Smelser and Cornellos, 1989; Beane, 1993).

As difficult as it is for so many adults to find anything to hang on to, we can only imagine what this age looks like through the eyes of young people who typically lack the resources that are available to most adults. The litany of statistics about self-destructive tendencies such as substances abuse, crime, and suicide must surely be seen as a signal from young people that many do not find much about themselves to like.

The idea of enhancing self-esteem becomes a moral imperative for schools, especially in a time when other social institutions and agencies seem unwilling or unable to provide support and encouragement in the process of growing-up.

Inside the school itself, the growing collection of studies on self-esteem indicates that there is a persistent correlation between it and such school concerns as participation, completion, self-direction and various types of achievements (Purkey, 1970; Rosenberg, 1979, Beane and Lipka, 1986). The correlation between self-esteem and achievement is the driving force in the growing interest in self-esteem. The link between self-esteem and school concerns ought to persuade those who have trouble with the moral argument that they, too, have a vested interest in enhancing self-esteem.

However, in such schools, the areas of curriculum and teaching, a premium is placed upon the following parameters:

- Collaborative teacher student planning;
- Co-operative learning;
- Thematic units that emphasize Personal and Social meanings;
Student Self-evaluation;
♦ Multicultural content;
♦ Community Service projects; and
♦ Activities that involve making, creating, and doing (Beane, 1993).

Beane, (1993) Concluded that there is a need to enhance self-esteem on adults particularly Teachers, since it is likely, they are the ones who contribute a lot in inculcating positive self-esteem in young people.

Enhancing Self-Esteem helps build the personal and collective efficacy that helps us out of the morass of inequity that plagues us today. Our Schools have the responsibility to extend democracy, human dignity, and cultural diversity throughout the larger society only if self-esteem is promoted at school levels. (Beane, 1993) state that a school that enhances self-esteem could be characterized as promoting the following:

♦ humanistic and democratic climate;
♦ student Participation in Governance;
♦ heterogenous grouping; and
♦ positive expectation.

ROLE OF TEACHERS IN ENCOURAGING SELF-ESTEEM:

Teachers intuitively know that when students feel better about themselves, they do better in school. More and more students have low levels of self-esteem because youngsters today, are not receiving enough positive, nurturing attention from adults, either at home or at school.

To raise the level of self-esteem of students, the teacher must start with the school staff. Students learn through modelling and imitation. If teachers have low self-esteem, they are likely to pass it on to their students. Teacher/student interactions must be positive, validating, affirming, and encouraging. This will increase students’ self-esteem hence improve their prospects for success.

Teachers may therefore make a difference in how students feel about their abilities in particular subjects. Given this responsibility a teacher can achieve this objective by following the recommendations of Canfield, (1990) as stated in Table 1.5 below.
Table 1.5
Enhancing Self-Esteem

- Value and accept all pupils, for their attempts as well as their accomplishments;
- Create a climate that is physically and psychologically safe for students;
- Become aware of your own personal biases (every one has some biases) and expectations;
- Make sure that your procedures for teaching and grouping students are really necessary, not just a convenient way of handling problem-students or avoiding contact with some students;
- Make standards of evaluation clear; help students learn to evaluate their own accomplishments;
- Model appropriate methods of self-criticisms, perseverance, and self-appraisals;
- Avoid destructive comparisons and competition, encourage students to compete with their own prior levels of achievement;
- Accept a student even when you must reject a particular behaviour or outcome;
- Students should feel confident;
- Remember that positive self-concept grows from success in operating in the world and from being valued by important people in the environment;
- Encourage students to take responsibility for their reactions to events; show them that they have choices in how to respond;
- Set up support groups or "Study buddies" in school and teach students how to encourage each other;
- Help students set clear goals and objectives. Brainstorm about resources they have for reaching their goals, and;
- Highlight the value of different ethnic groups, their cultures, and accomplishments.


APPROACHES OF ENHANCING SELF-ESTEEM AT SCHOOL LEVEL:

Beane, (1990), suggested three approaches of enhancing self-esteem to young students at School level. The following are the suggestions:

"Being NICE"

Personal Development Activities (PDA) such as sensitivity training where a teacher and a group of students sits together in a circle talking about how much they like themselves and everyone else for twenty minutes. "Being nice" – has a place in enhancing self-esteem though it is not enough.

"Direct Instruction Regarding Affective Matters"

Put young people through a self-esteem programme or course offered in a set-a-side-time slot during the school day. The teacher comes armed with more than good feelings, namely a self-esteem Curriculum locally prepared or
commercially purchased and assuring students that those who go through the Programme will have better self-esteem, and thus, be immune to self-destructive behaviours and school failures;

*Get Tough Policies*

The negative affect of *get tough policies* is not a promising route to self-esteem and self-efficacy. However, schools should adopt the third approach by recognizing the power of the environment and begin search for possibilities across the whole institutions (Beane, and Lipka, 1986; Beane, 1990).

**LEARNING OUTCOMES**

The term learning refers to the acquisition of behaviour being developed by the new S-R connections. It is a relatively permanent behaviour change tendency and is the result of reinforced practice (Kimble, and Garmezy, 1963; Melvin, 1969; 1970). Learning, may be defined as a relatively enduring charge in behaviour, which is a function of prior behaviour usually called practice (Melvin, 1970). It is not simply an event that happens naturally, but an event that happens under certain conditions (Gagne, 1977). These conditions can be altered and controlled leading to the possibility of examining the occurrence of learning by means of the methods of science.

Gagne’s view point on learning is that it occurs when certain observable changes in human behaviour take place that justify the inference of learning (Gagne, 1977). The inference of learning is made by comparing what behaviour was possible before the individual was placed in a learning situation and what behaviour can be exhibited after a learning situation (Gagne, 1977). Keppel’s viewpoint on learning is expressed in terms of its significance which lies primarily on its interactions with affective and cognitive variables (Keppel, 1964).

Thus, learning includes the ability to recall various parts of the learned material (Tolman, 1932). Many of the basic principles of learning which have been developed in the laboratory are applicable to the school situation.

Learning is not limited to school. It occurs when experience causes a relatively permanent change in an individual's knowledge or behaviour (Guilford, 1955; Hill, 1990; Schwartz and Reisberg, 1991). The change may be deliberate or intentional for better or for worse (Guilford, 1955; Schwartz and Reisberg, 1991). To qualify learning, this change must be brought about by
experience and by the interaction of a person with his or her environment. Changes due to simply maturation such as growing taller, or turning grey, do not qualify as learning (Catania, and Harnad, 1988). And temporary changes due to illness, fatigue, or hurt are also excluded from a general definition of learning (Catania, and Harnad, 1988).

Usually, changes resulting from learning are in the individual’s knowledge or behaviour (Guildford, 1955). Psychologists differ on the type of changes that can cause learning. Some emphasize the change in knowledge whereas others emphasize on the change in behaviour (Schwartz and Reisberg, 1991). Cognitive psychologists who focus on the change in knowledge believe that knowledge is an internal mental activity that cannot be observed directly (Schwartz and Reisberg, 1991; Woolfolk, 1993). Behavioural psychologists assume that learning outcomes is a change in behaviour. They therefore emphasize on the effects of external events on the individual, which may alter the behavioural change of the individuals. Some early behaviourists like Watson J.B. took the radical position that since thinking intensions and other internal mental events could not be seen or studied vigorously and scientifically, because these mentalisms as he called them, should not even be included in the explanation of learning (Restle, 1975; Woolfolk, 1993; Hill, 1990).

Whenever an information is to be used later, it is possible that logically, the information must be stored, hence, its availability at a later time is of paramount importance. Finally, when it is needed, it is then retrieved (Tolman, Honzik, 1930; Tolman, 1932).

When the learner is subjected to a learning situation, he undergoes certain experiences, which include some perception; manipulation of ideas; feelings; and some motor activity (Wingo and Morse, 1970).

In any learning situation, there must be the learner having the attributes of past experience; present abilities needs; and feelings (Wingo and Morse, 1970).

All these bring in changes in the learner’s ways of perceiving, thinking, feeling, and doing things. Learning may therefore be defined as changing one’s potential for seeing, thinking, feeling, and doing through experiences, partly perceptual, intellectual, emotional and partly motor (Wingo and Morse, 1970).

Both learning and performance are almost intricately inter-locked. Performance is the gauge of results, which has come about as a result of
behaviour change in learning. It processes change in performance, which may take the form of:

- The development of a new response to a stimulus or,
- Shifting an existing response to a new stimulus.

It occurs when the stimulus situation together with the contents of memory affect the learner in such a way that his performance changes from a time before being in that situation to a time after being in it. The change in performance leads to the conclusion that learning has occurred (Melvin, 1969). The change may be an increased capacity of performance an altered disposition of attitude and interest or value (Gagne, 1977) and the change must be capable of being permanently retained over some period of time (Lewin, 1948).

Changes in behaviour are brought about by changes in perception, attitude, and information. Thus, voluntary attendance, informality of meetings, freedom of expression in voicing grievances, emotional security, and avoidance of pressure may contribute to the conditions that nurture change (Lewin, 1948).

Learners must participate fully in selecting the issues to examine, analyse and initiate action on educative processes and that primarily emerge with them (Dewey and Freira, 1963).

At the time of learning, subjects seem to be engaged in finding some sensible principle of organization for the learning materials. But, at the time of recall, they are searching their memory, using whatever interior relationships they have detected during storage as their guide to facilitate recall (Melvin, 1969). Thus, testing in the learning phase involves the application of retention and transfer sessions (Melvin, 1969, 1970).

Gagne (1977) found a hierarchical principle useful for moving from learning principles to the other sequencing of instruction by making hierarchy the basis of approach to a theory of instruction through a desirable sequence characteristics associated with five types of learning outcomes (Gagne, 1977; Gagne and Briggs 1974). The occurrence of learning is inferred from the difference in human beings' performance before and after being placed in a learning situation (Gagne, 1977). The types of learning outcomes which Gagne, called varieties of learning capabilities must be observed as human performance
behaving characteristics with varying specific details (Gagne and Briggs, 1974).
These varieties of learning outcomes are:

- Intellectual skills,
- Cognitive strategy,
- Verbal information
- Attitudes and
- Motor skills

i) Intellectual Skills

This is the kind of learned capability, which involves the use of more complex symbols like distinguishing, combining, tabulating, classifying, analysing, and quantifying, objects and events with the help of symbols. The internal learning conditions for learning an intellectual skill consists of the previously learned skills, which are components of new skills.

Gagne, and Briggs, (1974) concluded that intellectual skills are bridges the learner can reach cognitive strategies. They therefore make it possible for an individual to respond to a big environment through symbols, language, numbers, and other kinds of symbols that represent the actual objects of the person's environment.

ii) Cognitive Strategy

Strategies are skills by which the learners regulate their own internal processes of attending, learning, remembering and thinking (Gagne, 1974). They are internally organized skills which govern the learner's own behaviour.

iii) Verbal Information

Information is an important capability. When it is organized into a body of meaningfully inter connected facts and generalizations, then it is referred to as knowledge.

The availability to the learner of cognitive structure of meaningfully organized information is one prerequisite skill the learner must possess as his own set of both internal and external condition (Ausubel, 1968; Gange, and Briggs 1974). Such structures of organized knowledge are considered to have been previously learned and are related to the new information to be learned (Ausubel, 1968). Images and pictures in children's learning also found similar
evidence with regards to verbal information learning (Rohwer, 1970). The effectiveness of advance organizer model by stimulating cognitive structure through improving learning and retention was cited by Ausubel, (1960) and (Ausubel and Fitzgevald, 1962). Externally, a verbal communication, picture or other cues and hints may be presented for the purposes of stimulating recall of a larger body of meaningful information (Ausubel, 1960; Ausubel, and Fitzgerald, 1962; Gagne and Briggs, 1974).

iv) Attitudes

Attitudes are described as the internal states that influence or moderate the individual’s personal action. They are complex states of human organism, which affect his behaviour towards others, things and events. It is a system of belief, a state rising from a conflict or disparity in beliefs (Festinger, 1957). Festinger’s views tend to point out the cognitive aspects of attitudes, while Krathwohl, Bloom and Masia (1964) have given the learning outcomes of attitudes in the affective domain.

The occurrence of attitudes may be seen in the way in which the individual invigorates the emotions. An attitude influences the individual’s choice of action and the cause of action chosen by the individual in any particular situation will be largely determined by the specifics of that situation. Thus, attitudes are internal state of the individuals, which affect the choice of action towards some objects, person or event. The measurement of attitudes may be accomplished through long term observation of the individual’s behaviour performance i.e. in a classroom setting, a teacher may record his observations of an elementary pupil over a weekly period, according to the number of times he helps his classmates as opposed to interfering with their activities.

v) Motor Skills

Motor skills are learned capabilities that underline performances whose outcomes are reflected in the rapidity, accuracy, force or smoothness of bodily movement (Gagne and Briggs 1974). Learning and performance of motor skills include the senses and the brain as well as the muscles. The action is performed to meet certain standards of speed, accuracy, force and smoothness of execution. The system of kinaesthetic sensing over successive periods of
practice brings about the gradual improvement in the smoothness and timing of motor skills (Gagne, 1977).

Thus, human organisms learn many different things during his lifetime, and learned capabilities differ in human performances (Gagne, 1977). They also differ in the conditions, which are most favourable for their learning. Implications for identification of learning conditions involve the following (Gagne, 1977).

♦ **Planning**: the conditions for planning must be carefully observed before the student enters into the learning situation. Planning involves students' capabilities before and after any learning enterprise. The teacher must know where to begin, where he is going, goals, specific prerequisite skills of the learner, the objectives and the learning achievements.

♦ **Managing Learning**: Managing learning involves how the student can be motivated to continue learning by directing and guiding his interests and assessing the learning outcomes (Gagne 1977).

♦ **Instruction**: This involves the requirement of the learner to retain the learning capabilities acquired during the instructional stage. Gagne argues that instruction is intended to promote learning and the learning situations need to be arranged to activate support and to maintain the internal processing that constitutes each learning event.

Thus, inorder for instructional learning outcomes to be the end product, prediction to learn must be taken into consideration. The learner should structure the body of knowledge for easy understanding. Specification of structured knowledge and sequencing the material must be quite effective for better learning outcomes.

**REVIEW OF RESEARCH STUDIES**

**RESEARCHES IN RELATION TO MASTERY LEARNING STRATEGIES**

Many students of various educational levels have participated in and still continue to participate in educational programmes structured according to the mastery model. The mastery model comprised of all of its six components. Summaries of the various results of researches that investigated the impact of
mastery model implementations upon students' cognitive, affective, and psychomotor performances at school, college, and university levels have been placed below.

Cognitive Outcomes of Mastery Learning Strategies:

In this review of research investigating the cognitive outcomes of mastery model implementation, primary emphasis is given to researches in which the mastery model implementations were not dependent upon continued, extensive and frequent use of technical equipment. Such equipment includes computers, or audio-visual equipment, which were not readily available in the vast majority of the schools. The most common research format has been a comparison of an experimental group, which learned a particular topic using a mastery-structured curriculum, with a control group of students, purportedly identical to the experimental group with the exception that their curriculum did not include all the six components of the mastery model. The researchers demonstrated that experimental groups achieved higher scores as compared to control groups with their grade level subjects such as: Fifth grade Arithmetic (Kersh, 1971). Fifth to sixth grade Reading skills (Prestige, 1997). Ninth grade Language Arts (Johnson, 1990); Ninth grade Algebra (Sawhney, 1993); Secondary Students Anxiety Levels (Yohon, 1996). Ninth grade After School Teacher Directed Tutoring (Hale, 1997); Sixth grade Peer Tutoring, Time- on –Task, and Cooperative Norms on Academic Success (Doyle, 1997). Sixth through Ninth grades Music (Abbott, 1997). First Year Algebra (Seymour, 1997); Learning Disability and Emotionally Impaired Students (Debra Sue, 1998). Third grade Mentally Handicapped and Difficult to Teach Children (Dube, 1998). Ninth grade peer teaching of the subjects in the study (Giacomo, 1999); Secondary level Ecology (DeBaar, 1999); and Grades Three through Seven Reading and Mathematics (Latham, September 2000).

But some researchers reported no difference between experimental and control groups in the subject areas viz: High school Biology (Kushner, 1981); Science (Brooks, 1983), High School Algebra (Ferris, 1984). Fifth grade Fractions (Ritchie and Thorkildsen, 1995); and High School Education Course (Whiting and others, 1995).
Introduction

Mastery procedures have also been used in numerous college courses. High performance of mastery learning group as compared to non-mastery learning group was reported in the various subject areas. In some studies (Marianne, 1999), one key finding was that the mastery opportunity led to greater retention than the non-mastery one. However, faster learners outperformed slower ones, regardless of the type of learning opportunity and both mastery and non-mastery learning opportunities yielded significantly greater retention than a single exposure (Marianne, 1999; Wong, 1999). Various researchers in the following subject areas have also reported effectiveness of mastery learning on Basic Arithmetic (Shrum, 1985); First Year Algebra (Ford, 1997). College students Algebra (Pezeshki, 1998); College Algebra (Guadalupe, April 1999), and Graduate Psychology Students (MacAllister, 2001) respectively.

According to Haller, Child and Walbert, (1998), there is sufficient evidence about the benefits of strategy of instruction, so that strategies can be used to improve student learning. The effectiveness of mastery learning on techniques on the performance of a transfer of training tasks using mastery techniques of self-directed feedback, reinforcements, and remediation of knowledge on the performance of a work related task have also been investigated by (Kahnweiler, 1998). Results showed that the effect on transfer of knowledge from the classroom to work related tasks were statistically significant.

The success of MLS was reported when data analysed indicated that students enrolled in the treatment group using innovative approach demonstrated significantly higher gains in college algebra than the students enrolled in the control group using traditional approach (Guadalupe, 1999). Analysed results indicated that cooperative learning and mastery learning were effective teaching strategies and achievement effects of mastery learning and cooperative learning were found to be significantly greater in treatment classes than in control classes (Guadalupe, 1999).

The efficacy of improving fundamental learning and its subsequent effects on recall, application and retention was conducted by Wong, (1999). One method to learn such fundamental material has been the mastery paradigm (Bloom, 1956). Using this approach, students learn a particular knowledge until
they achieve a predetermined accuracy criterion, for example 90% correct, on post-learning test. This design consisted of multiple learning units and instructional groups, sub-groups, and individual descriptive analyses revealed that posttest achievement scores were higher for items learned to both accuracy and speed than Accuracy. Results also showed that learning was more resistant to extinction for concepts that had previously been learned to Accuracy and Speed rather than Reading for Accuracy. The other factors that affected learning included subjects' baseline ability and the extent of their interest in the study.

Sui Jaw- Sin, (1997) studied whether the effectiveness of MLS of students enrolled in Private Universities in Taiwan in a mastery learning programme could attain the same level as High Ability Students from Public Universities enrolled in traditional programmes. The mastery learning method was used to teach three groups of Seniors with Low Ability studying in the Department of Accounting (DoAC) of a University in Taiwan of the Public Chun Shin University (CSU) and the Private Chinese Cultural University (CCU).

The traditional method was used to teach the control group which consisted of senior students of DoAC of CSU with High Learning Ability. As part of the mastery learning strategy, formative tests, quizzes, and the experimental group completed homework only. As predicted, there were no significant differences between the two groups' results on the pre-test scores. There were significant differences between the two groups' results on posttest scores. The findings therefore support the Ho of the study and reveal the effectiveness of mastery learning strategy on Low Learning Ability Students.

High performance of mastery learning and control group has also been reported in the subject areas of Biology, Psychology, and Philosophy (Moore et al., 1968; Statistics Mayo et al., 1968); Grammar Teaching and Communication (Takashima, 1995), and Assessment and Curriculum (Saranchuk, 1999).

Affective Outcomes of Mastery Learning Strategy (MLS):

Many researchers have investigated students' affective responses to both traditional and experimental methods of instruction through the use of attitudinal instruments. Among the researches investigating students' affective consequences associated with mastery model implementation, the most frequent
measurement was the students' report of their interest or attitude towards the subject matter and the instruction.

**McKenzie (March 2000)** investigated achievement and affective domains of High School Algebra I in traditional or self-paced mastery learning programme. Anxiety and students' attitudes towards mathematics were also investigated. Two classes of Algebra I was taught using traditional methods of instruction and two classes were taught using a Self-Paced Mastery Learning Programme (Learning Logic). Other affective variables like confidence in doing mathematics, anxiety, towards mathematics, and attitude towards mathematics were also measured prior and after the study through the Fennema-Sherman Attitude Scales. The results of this study indicated that students in the traditional classroom scored significantly higher than students in the Self-Paced mastery learning classes. Furthermore, the study suggested that self-paced instruction had a positive impact on reducing anxiety levels of male students.

**Block and Tierney, (1974)** employed the study to teach historiography to college students under mastery learning and found that students showed less positive attitude towards the subject matter than students of non-mastery. **DeFrance, (1994)** for the hotel and restaurant management students found no significant difference between experimental and control groups.

Mastery learning helped school children to develop positive attitude towards different subject areas as reported in Algebra (**Arlin, 1984; Block, 1970**), French (**Kuhn, 1985**) and Math (**Lovullo, 1986**).

Regarding attitude towards strategy, **Okey, (1976; Abbot, 1997)** and **Pedego, (1999)** found no significant difference between mastery and non-mastery group. However, the findings of **Pedego (1999)** further supported the claim that the use of a mastery learning technique can have a significant positive effect on the ability of the students to transfer knowledge from a classroom-training context to a work-related task. Positive attitude towards MLS has also been reported by **Joyce and Weil, (1988)** and **Dewayne, (1998)** respectively.

In a research study conducted by **Sherman, (1974); Koczor (1984); King and Karen (1991)** for teaching Introductory Undergraduate Psychology at Arizona State University Under ML, found that students exhibited positive attitude towards the course. **Hudson, (1995)** for teaching Physical Geology to University students of South Carolina under Modified Mastery Learning
Approach reported significant increase in affective scores of interest, enjoyment, and overall feeling about the course.

Quantitative investigations examined the perceptions of the Low-achieving English as Second Language (ESL) students of their Language Learning at the National University of Malaysia (Shah, 1999). This study further assessed the pattern of instructions from the views that these students hold their ESL learning experiences as related to attitude, motivation, socio-cultural influences, formal instruction, language education policy and their own individual characteristics. McCallum, (1999) conducted a study on the impact of self-esteem, study behaviour, attendance, type of graduation, and demographic variables on students' performance in remedial reading. The results showed that students' study behaviour was the most significant variable affecting their performance in remedial reading. Self-esteem was also highly correlated with performance in remedial reading. Contrary to expectations, students generally began the remedial reading programme with a high self-esteem. However, by the end of the semester, their self-esteem scores had dropped. They also exhibited poor academic confidence and poor long-term study behaviour thus, suggesting that they will eventually fail courses or drop out of college.

Affective Outcomes: MLS Perceptions:

♦ Self-esteem could be changed even in the late adolescent age by an appropriate manipulation of cognitive achievement (Modu, 1969).

♦ Jones, (1986) designed his study to determine the effects of ML on anxiety of Undergraduate Nursing students and found that there was no increase in mapped or other text format.

♦ Joyce, and Weil, (1988) stated that under ML, significant development in academic motivation occurred, but there was no significant development in study habits and study behaviour (McCallum, 1999).

♦ Cooperative ML improved self-esteem of the students (Bonaparte, 1989).
Positive relationship between students' self-esteem assessments and their achievement grades was found by Beane, (1990) and Woolfolk, (1993).

Self-esteem is a key factor in role performance and change in self-esteem results in drastic changes in performance (Woolfolk, 1993; Zhong, 1999; and McCallum, 1999).

By contrast, students low in self-esteem evaluate themselves unfavourably, believing that they are lacking an important aspect and that they have characteristics that others consider unappealing (Greenberg, and Baron, 1999) whereas people high in self-esteem evaluate themselves favourably, believing they possess many desirable traits and qualities (Greenberg and Baron, 1999).

Inside the school itself, (Purkey, 1970; Rubin, 1978; Rosenberg, 1979; Beane and Lipka, 1986; and Beane, 1993) concluded that the growing collection of studies on self-esteem indicates that there is a persistent correlation between it and such concerns as participation, completion, self-direction, and various types of achievements. The correlation between self-esteem and achievement is the driving force in the growing interest of self-esteem. The link between self-esteem and school concerns ought to persuade those who have trouble with the argument that they too, have vested interest in enhancing self-esteem. Enhancing self-esteem helps builds the personal and collective efficacy that helps us out of the morass of inequity that plagues us today. Our schools have the responsibility to extend democracy, human dignity, and cultural diversity throughout the larger society only if self-esteem is promoted at school levels.

**Psychomotor Outcomes of Mastery Learning Strategy:**

Rubin (1978); Larsen (1986) concluded that most students achieved success at improvisation in a Jazz Content and were able to acquire skills in using Seventh Chord. All students attained mastery score in the examination, which tested cognitive knowledge of Jazz idioms as taught through MLS.
Cognitive Outcomes of Bloom's Mastery Learning Strategy (B-MLS):

Cognitive Outcomes: Achievement:

Slavin, (1987) found that mastery-learning students achieved at twice the level of non-mastery students in terms of percentage correct on daily chapter tests with an effect size of more than 3.0. However, mastery-learning students spent more than twice as much time learning the same material. On retention time taken four days after the lesson, mastery students retained more than non-mastery students did. However, non-mastery students retained far more per hour of instruction than did mastery-learning students.

Whiting, Bryan, Van Burgh, Wright, Render and Garry, (1994) investigated the cognitive and affective student learning outcomes of 36 Semesters using the Mastery Learning Approach in Distributive Education Classes. The data collected over the years indicated that students' grades improved with mastery learning. However, the cognitive level of mastery had no effect on students' grades. Results further indicated that students worked hard to achieve whatever mastery level the teacher had designated and mastery learning produced successful learning experiences for at least 80% of the students. The study report results supported the concept that mastery learning can be effective in subjects other than those that are hierarchically organized.

The Texas Assessment of Academic Skills (TAAS, 1998) being a State mandated criterion referenced or mastery test measured statewide student mastery curriculum in reading and mathematics at Grades Three through Eight at the exit level. Results indicated that the strategies and initiatives that have been used to improve students' achievement in mathematics have been successful, and should be continued. However, the strategies and initiatives for improving students' achievement in reading and writing need to be reviewed.

Hsiao, (1999) investigated the effectiveness of deductive, inductive, and alternative combined instructional approaches and their relationships with both analytical and holistic cognitive styles or combined teaching approach on the Grammar learning of foreign language Field Dependent (FD) and Field Independent (FI) in the beginning- level college Spanish course. Research findings revealed no statistically significant difference among the deductive, the inductive, and the alternative combined approaches. There was no significant interaction disclosed between treatments and either FD / FI or rational versus
experimental aptitude style. Thus, results of the study demonstrated the importance of prior knowledge in predicting grammar-learning outcomes.

Cakan, (2000) investigated the interaction of cognitive style and assessment format (Multiple Choice) and performance based assessment (PBA) in Spanish proficiency as a second language for Eighth grade students. Utilising a sequential mixed model design consisting of both quantitative and qualitative methods, Cakan, (2000) investigated the performance difference between Field Dependent (FD) and Field Independent (FI) students on different test formats Phase I. The results revealed that cognitive styles had a statistically significant effect on student performance whereas the effects on gender, ethnicity, and socio-economic status of the students were not significant. A Two- factor Split-plot analysis revealed a significant interaction of cognitive style and test format. The results further confirmed the superiority of FI group over the FD group but no indication of such difference was observed for the PBA. Furthermore, the results indicated that FD PBA students scored better on the PBA than they did on the Multiple Choice (MC). And the FI students scored better on the MC. Overall, the study indicated that compared to multiple choice (MC) format, the performance-based assessment (PBA) of second language proficiency is less impacted by student attributes such as cognitive style, gender, ethnicity, and socio-economic status.

Numerous researches have been carried out on MLS involving students’ perceptions on motivation, changes in mastery motivation during early childhood Hauser-Cram, (1998), Grade Eight students study habits (Cakan, 1999) and students’ attitudes, anxiety and self- esteem (Whiting Bryan, Van Burgh, Wright, and Gary, 1994). The researchers also investigated students’ affective outcomes in other subjects as Seventh through Eighth grade Language Vocabulary (Virginia, 1998) and Early Childhood Education English Language (Penny, 1998).

But some researchers reported no significant difference in terms of students’ assessment preferences among the deductive, inductive and the alternative combined approaches (Hsiao, 1999).
REVIEW OF RESEARCHES ON ADVANCE ORGANIZERS

Recent advances have been made in facilitating implementation of Ausubel's advance organizer strategy. One reason Ausubel's approach has not been widely adopted is its lack of specificity about how to relate what is to be learned to what has already been assimilated within the cognitive structure. The use of subsumptive sequencing, coordinate linkages and the activation of appropriate generic or cognitive skills are three approaches for providing anchorage for the assimilation of new knowledge (Ricci, 1999). Subsumptive sequencing has to do with arranging material to be taught in a hierarchical relationship, co-ordinate linkage has to do with arranging material to be taught in a co-ordinate relationship, and activating appropriate cognitive skills has to do with arranging material to be taught in an analogic relationships (Castillo, 1998; Ricci, 1999). Instantiation and elaboration are strategies for emphasizing hierarchical relationships. While comparison or contrast and synthesis emphasize co-ordinate relationships, and the use of analogies and metaphor emphasize analogic relationships (Baker, 1998; Tome, Takahashi, Shawn and Glynn, 1998).

During the 1960s' Ausubel and his colleagues published a series of reports, which provided both an empirical and theoretical basis for the effects of advance organizers on learning from the text (Ausubel, 1960, 1963; Ausubel, and Fitzgerald, 1961, 1962; Ausubel and Youssef, 1963; Fitzgerald, and Ausubel, 1963). In a typical study (Ausubel, and Youssef, 1963), college students read a 2500-word passage on Buddhism after reading either a comparative advance organizer, which pointed to the relation between Buddhism and Christianity or a non-organizing historical introduction. Retention for the target passage as measured by an achievement test was higher for the advance organizer group-presumably due to the learners being encouraged to understand new concepts (Buddhism) in terms of Christianity. But Mayer (1977a) has noted that Ausubel's studies generally found only small advantages in recall due to advance organizers.

However, Barnes and Clawson, (1975) has raised the question of whether or not there is any empirical support for the claim that advance organizers influence the learning of conceptual material. Of the 32 studies
reviewed, 12 reported that advance organizers facilitate learning, and 20 reported that they did not. Thus, the efficacy of advance organizers has not been established and no clear patterns emerged regarding the facilitative effects of advance organizers (Barnes and Clawson, 1975).

Based on the above review in which 20 out of 32 studies failed to produce significant results, Barnes and Clawson, (1975) were forced to conclude that advance organizers, as presently constructed, do not facilitate learning.

However, Mayer, (1979) pointed out three important limitations of the Barnes and Clawson’s review, to offer several theories of advance organizers, and then to summarize the empirical results of a series of nine experimental studies, which test the theories and overcome these flaws. The conclusion of this series of empirical studies of advance organizers is that there are definable situations in which convincing evidence of the effects of advance organizers has been established (Mayer, 1979). The three main limitations of Barnes, and Clawson’s review that Mayer (1979) addressed were inadequate statement of the to-be-tested theory; inadequate analysis of the learning outcomes; and inadequate experimental control.

Thus, Barnes and Clawson’s review is limited by the fact that they did not specify the conditions under which advance organizers should have an effect. They did not present data that adequately analysed the nature of the learning outcomes. And they did not adequately discuss the problem of experimental control in the studies they cited (Mayer, 1979). The core of these problems cited above may be traced to Barnes and Clawson’s failure to present useful cognitive theories concerning the effects of advance organizers.

Results of researches concerning the use of advance organizers have been mixed and it has been suggested that one reason for these mixed results is a lack of theoretical guidance in defining advance organizers and testing learning outcomes. Traditional assessment methodologies include tests of recall and recognition as well as measures of transfer and retention. Ricci, (1999) designed specific advance organizers, which lead to different learning outcomes. The main purpose of Ricci’s study was to: Define the construction of advance organizers, test several variations of advance organizers in a training domain in order to examine differential declarative and lastly structure knowledge or learning outcomes. Data were collected to test differences in the three advance
organizers i.e. Development of declaratives, structure knowledge and advance organizer developed based on Ausubel’s, (1960) definition of advance organizer and was therefore, termed as a traditional organizer.

Results from the pilot study showed that in the absence of training, neither of the three advance organizers differentially contributed to knowledge outcomes. The results from the second experiment however, did not show ability for a specific organizer to enhance a related knowledge outcome nor did the data show any effect for participants’ reaction by experimental condition. However, results did show that participants that were provided organizers prior to training showed significantly positive correlation between structural knowledge outcomes and task performance. Conversely, participants that were provided organizers following training did not show a significant correlation between structural knowledge and the task performance.

Thus, based on the limited research findings, (Mayer, 1975; 1979; Ricci, 1999) it is reasonable to conclude that Advance Organizers, when used in appropriate situations, and when evaluated adequately, do appear to influence the learning outcomes.

Witiw, (1997), investigated the effectiveness of advance organizers, presented through technology, on the academic success of 67 High School Basic Aviation Meteorology students. The researcher developed a set of lesson plans detailing the content of the advance organizers for a six-week period. One section received all the organizers via technology. A second section received all the organizers by traditional means (paper hard copies). The third section received a combination of treatments. Students were statistically matched on SAT Scores, of High-school Grade points, Averages, a Pretest, and a Test administered prior to commencement of treatment. Results of the analysed data revealed that use of technology significantly increased the achievement of students’ conceptual knowledge when measured by posttests administered immediately following treatment periods.

In many studies, the success of the effectiveness of advance organizers at school level in different subject areas have been cited in thirty-two High School Science students (Kikman, 1997); High School Meteorology Students (Witiw, 1997); High School Science students (Cavalier, 1997). Seventh through Eighth grade students Provision of Rich Learning Environment (Davidson, 1998)
Hatch, (1998) examined the potential effects of using specific learning objectives to create advance organizers, practice, exercises, and feedback and to vary their positions within instructional materials to improve learner achievement. The effects of varied advance organizer strategy and locus of control orientation on instructional time and testing time were also investigated on 161 adult-volunteers who completed Rotter's Locus of Control Survey to identify their locus of control orientation. Information about the learners' locus of control was collected and used in the analysis to determine if locus of control orientation affected learner performance on the criterion tests. The study found no significant differences in performance scores between locus of control groups among the treatments. The instructional treatments used in this study did not indicate significant differences in learning performance except on the Drawing Test. The Drawing Test which was designed to evaluate learners' ability to construct and reproduce items in their appropriate context revealed that all three treatments containing advance organizers, practice, and feedback strategy revealed significant improvements in performance on the Drawing Test when compared to the control group. Also, the analysis determined that treatments providing an initial advance organizer with practice and feedback exercises following relatively early in the instructional materials tend to enhance performance better than the alternatives addressed in the study.

The study therefore, concludes that sample questions included in instructional materials help focus the learners' attention on specific-to-be learned information. Therefore, in relatively short instructional booklets, the effect of a single advance organizer strategy located early in the instruction could offer maximum benefits for improved performance without a significant increase in the time-spent learning.

Wells, (1999) measured the change, if any, in the students' conceptual understanding of biology course content using concept maps as advance organizers (experimental) or a standard lecture format (control) on 190 community college students enrolled in General Biology. The findings of the investigation revealed that concept maps used as advance organizers had a significant impact on students' conceptual understanding of biology course
content. The use of concept maps as advance organizers had a significant effect on student conceptual understanding of biology when students are classified according to their cognitive development level, age, gender, major, course time, and educational background. A significant relationship between cognitive development and conceptual understanding was also found significant.

The researcher concluded that the use of concept maps, as advance organizers is an effective method for improving student learning in General Biology classes and a positive relationship exists between students’ cognitive development level and conceptual understanding. Shrader, (1999) therefore suggested that programme-controlled sequencing and advance organizers produce an effective synergistic effect for more efficient learning with students possessing low content domain knowledge.

Applin, (2000) explored the relationship between assignment based teaching methods and achievement in an introductory programme course where 42 community college students in south Mississippi were involved in the research. The results concluded that programming style, documentation, practices, parameter passing mechanism use, code reuse, and modularization practice of those students who had been part of the experimental group was superior to that of the control group participants. In his exploratory research investigating the effects of advance organizers and learner controlled sequencing in a web-based learning environment, Shrader, (1999) students who were given programme-controlled sequencing completed instructional materials in 13 per cent less time than those who were given learner –controlled sequencing. Advance organizers proved more efficient learning by reducing the time students spent applying the newly learned material. And students who were given advance organizers completed the performance test in 15 per cent less time than those who were not given advance organizers did.

However, the analyses showed that either learner-controlled sequencing or advance organizers did not affect students’ test scores. But those who consistently took least amount of time were students using programme-controlled sequencing with advance organizers. When compared to the group taking the most time, this group was 20 per cent faster learning the instructional materials and 25 per cent faster completing the performance test.
But, some researchers reported no significant differences between experimental group using advance organizers and control group in the subjects like Computer-based instructional Science programme (Cavalier, 1997) and Third –Semester College Students (N=129) studying French as a Foreign Language (Pruliere, 1998). The two results conclude that students with advance organizers, either a picture or tile did not score significantly better than students without an advance organizer did (Pruliere, 1998). And Cavalier, (1997) conclude that students who were presented with instructional objectives performed significantly better on intentional posttest items than students who received either advance organizers or no orientating activities. The results therefore did not reveal any significant effect for either enroute performance or attitude (Cavalier, 1997).

Chao, (1997) studied how listening English Comprehension is affected by strategy use, and what combination of strategies works best for students listening to authentic texts. The subjects comprised of 229 Chinese students majoring in English or English Education at six Universities in Taiwan. Results showed that there was a positive relationship between strategy use and listening comprehension. Factor analysis identified five factors used interactively by effective listeners: Functional, Self-management, Macro-conceptual, Micro-conceptual, and Social-strategies. Results further revealed that less effective listeners reported losing concentration easily and females reported using more note taking, advance organizer, self-evaluation, but less listening to individual sounds than male students. Previous experience in an English speaking country gave students confidence in their listening abilities and they could make inferences and guess more frequently than less effective listeners or those who had no travel experience. The results concluded that more proficient students reported meta-cognitive strategy use than less proficient learner (Chao, 1997).

McManus, (1998) examined Nonlinearity of an instructional presentation and advance organizers in relationship to a learner self-regulation. The sample consisted of 119 undergraduate students who wee randomly assigned to one of six different hyper-media instructional treatments. Three levels of nonlinearity high, medium, and low were represented in the treatments. Each of them further split into those with and without advance organizers. Data analysis of achievement measures showed two near significant (P=0.052 and 0.54)
interactions, between advance organizer by level of nonlinearity and level of nonlinearity by self-regulated learning. While the results were not statistically significant, they suggested relationships that can be examined in further studies.

**Affective Outcomes of Ausubel’s Advance Organizers:**

Cavalier, (1997) investigated the effects of learning strategies and orienting activities in science instructional programme. Students' attitude was measured using a paper-and-pencil survey. Results revealed that orienting activities had a significant effect for orienting activity on incidental posttest scores. In addition to performance, results revealed that orienting activities had a significant influence on interaction behaviours. Dyads who received either objectives or advance organizers exhibited significantly fewer off-task behaviours than those who did not receive orienting activities.

Students’ perceptions of timely feedback and integration of students’ presentations were found to significantly contribute as individual behaviours to students’ satisfaction (Chamberlain, 1999).

The study was to determine whether the advance organizer would affect students’ perception of instructor communication competence and to determine the effect the organizer would have on High School English III (American Literature) students’ achievement. No significant difference was found among either the attitudinal surveys or the achievement quizzes (Thibodeau, 1999).

Thurman, (2000) studied self-esteem, academic-self concept and academic achievement of African American students in grades Five, Seven through Ten in a predominantly White suburban school district. Results revealed that although African American students in this study reported high self-esteem at each grade level, self-esteem did not increase across the grade levels as hypothesized. Self-esteem scores of students in grade Five were higher than middle, and high school students. No correlation existed between academic achievement and self-esteem at any grade level. Students in grade Ten showed a significant correlation between academic self-concepts scores and achievement as measured by semester report card averages whereas no significant correlation between academic self-concept and achievement was obtained at grade Seven or Five. Results from students interviewed revealed that the determinants of self-esteem, in relation to African American students,
are not associated with academic achievement, but rather relate to peer acceptance, participation in sports, or other non academic factors. An important finding from students interviewed revealed that academic self-concept of ability may produce a more positive correlation between academic achievement than global self-esteem.

Castro, (2000) studied the effects of bilingual education on self-esteem and ethnic identity on Third and Fourth grade Mexican immigrant children. Results from this study found no significant differences in self-esteem scores between children in bilingual education when compared with those in English only classroom, except on the anxiety sub-scale of the Piers-Harris. Children in bilingual education revealed a higher level of anxiety.

Titsworth, (2000) tested the effects of teacher immediacy, organizational lecture cues, and student note taking on student affective and cognitive learning. Teacher immediacy behaviours include verbal and non verbal stimuli which generate perceptions of psychological closeness between a teacher and his / her students and immediacy behaviours can include eye contact, personalized examples, vocal variety, and natural movement about the classroom. Organizational lecture cues are verbal signals indicating the structural elements of a lecture. These cues can consist of verbal advance organizers, explicit transitions between main and subordinate points, and verbal summaries of lecture content. Results of the experiment indicated that teacher immediacy had its greatest effect on students' affect towards instruction. Teacher immediacy had its most substantial effect on immediate student's affect, and had some negative effects on cognitive learning. Organizational cues also had a moderately consistent effect on cognitive learning.

Analogies are vital to human thinking, but surprisingly, various educators and educational researchers pay little attention to them. Deep-seated analogies can profoundly affect the way research findings are interpreted (Baker, 1999). Even research results that are true can produce false conclusions if examined through the mental filter of a flawed analogy. Venville, (1997) examined the role of analogies in biology education and stated that although an integral part of biology and biological education, analogies have constraints as well as benefits. Their current use can contribute to improved understanding of scientific concepts, but inappropriate use can foster ideas that are different from accepted
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scientific beliefs. Venville, (1997) therefore suggested that a Three-Phase Teaching Model Based on Focus, Action, and Reflection can help biology teachers to use analogies optimally.

However, few researchers have examined the role that analogy can play on the students’ cognitive structure. Glynn, (1998) examined the role of an elaborated analogy and concluded that it had both graphic and text components that integrated and mapped key features from an analog (a factory) to the target concept (an animal cell).

Analogy has therefore been interpreted as acting as a mediator between the students’ existing knowledge, and the new knowledge in the text. Some researchers (Tome, Takahashi, Shawn and Glynn, 1998) found that analogies and metaphors are creative and powerful tools for assimilating new information and fitting it into one’s existing knowledge base. Children who were instructed in analogies solved more analogies correctly and offered more parallel explanations than those who did not have analogy instruction (Baker, 1998; Castillo, 1998). Wang, (1998); Clement, (1998) concluded that enhancing children’s ability to understand and learn from analogies and metaphors has useful and varied classroom applications. Lai, (1998) also concluded that subjects who received the lesson with static graphics of analogy received significantly higher scores on their performance. However, their attitudes towards analogy using different visual display were not affected (Lai, 1998).

Stollak, Mary Alice, Alexander, and Lois (1998) also concluded that teachers who use analogy, metaphor, and simile in rehearsals could help young musicians grasp important musical concepts. In addition, these likeness statements help to further the composer’s aims for the work being rehearsed and furthermore, these statements enable the conductor to say one thing in many ways, each way helping students with different learning styles.

Clement, (1998) examined the dynamics of analogies in understanding physical phenomena and solving problems in science. The results revealed that spontaneously generated analogies could play an important part in expert problem solving.

In a study in which the method of bridging analogies was incorporated in teaching techniques for dealing with High School students’ preconceptions in mechanics revealed that students who were taught by this technique gained
significantly higher scores than those who were not taught by this technique (Clement, 1998).

One of the most recent formats has been a comparison of an experimental group, which learned a particular topic using analogy-structured curriculum, with a control group of students, purportedly identical to the experimental group. The exception is that the curriculum of the control group did not include all the components of Ausubel's Advance Organizers Model. The researchers demonstrated that experimental group using analogy as advance organizers achieved higher gain scores as compared the control group with their grade level and subjects such as: Ninth grade Hauptschule students, Electrical Circuits and Electrical Tension (Kircher, 1996). Disabled Children with Reading Disability (Greaney, 1997). Early Childhood Education Lexical Analogies in Reading (Savage, 1997). Analogical Problem-Solving of Ten through Thirteen months old infants (Chen, Zhe, Sanchez, Rebecca, Campbell, and Tamn, 1997). High School Biology Concept Attainment (Lagoke, Bolatito, Jegede, Olugbemivo, and Oyebanji, 1997). First graders at a Public Elementary School Word Reading (Wang, 1998) and High School Science Assessment (Pittman, 1999).

But some researchers reported no difference between experimental and control groups in the subject areas like Ninth grade students studying electrical circuits (Kircher, 1996). Despite this, Wolfgang, (1996); Kircher, (1996) concluded that analogies can lead to a greater understanding and comprehension of electrical circuits and electrical tension.

However, when Glynn's Teaching-with-Analogy Model was used (Oyebanji, 1997), results indicated that boys and girls who were taught with environmental analogies benefited significantly compared to those who were not. And that the use of environmental analogies seemed to have resulted in equivalent performance of boys and girls in the attainment of biological concepts contrary to evidence from other studies that it weighed heavily to the advantage of boys. Results also indicated that the use of environmental analogies from students' socio-cultural environment has potential for biological teaching, particularly in enhancing the concept attainment of students of non-western background who study science in a formal setting. And that it is possible to obtain comparable achievement levels for boys and girls at the secondary level.
Analogy procedures have been used in numerous colleges. High performance of analogy group as compared to non-analogy group was reported in various subject areas by the following researchers of Practicing Primary School Teachers Teaching of Electricity science course (Heywood, 1997). The American biology Teachers: Biology Education (Venville, Grady, Treagust, and David, 1997). College Science Teachers using Extended Text –Based Analogies used for Instructional purposes in the teaching of science (Iding, 1997). College students computer-based learning programmes through analogies (Lai, 1998) and College Music Educators, (Stollak, 1998).

Neuman, (1998) investigated the effect of self-explanation on analogical problem solving using twenty-four University students from the social science faculty. The students were prompted either to self-explanation or to think-aloud. Results indicated that students prompted to self-explanation performed better in the test phase. However, one category pertaining to the surface structure of the problems studied had detrimental effects on further problem solving and concluded that in contrast to the previous findings, only certain kinds of self-explanations improved analogical problem-solving.

REVIEW OF RESEARCH STUDIES ON COGNITIVE STYLE

_Cognitive Style and Achievement:

Randolph (1983), studied the relationship among cognitive styles, achievement in science and some selected personality variables and sex of the students. The results indicated that students receiving special instructional treatment correctly tested significantly more variables on the post-test task than did those in the other group. Special treatment was effective for Field-Dependent as wells as for Field-Independent students, while the other treatment was effective only for field-independent groups. A separate study conducted by Randolph (1984), investigated the relationships among cognitive style and achievement in science. The results revealed that there was significant correlation among field independent and science achievement, self-reliance and science achievement. However, the results further indicated that there was no significant difference between the performance of males and females on the science achievement. Atang, (1985) also reported that individual’s Field-Dependence/Independence was not a significant factor in their performance in
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The pre-test/post-test. But in both the colours, black and white subjects proved superior to the control group subject in post-test scores and that there was no significant relationship between pre-test/post-test line.

The effectiveness of cognitive style over the conventional group learning (CGL) has been studied by many researchers in the subject areas like Mathematics First Through Second Grade French Pomjít, (1991) and Science Sixth Grade Students (McWhirter, 1991) and social studies 4th through 5th grade students logo programming (Easton, Charles, and Watson, 1993). The results of these studies revealed that in most cases, Field-Independent groups had a marginal advantage over Field-Dependent group (Watson, 1989); Field-Independent subject's performance were significantly better than field-dependent subjects in analogical problem-solving and subjects who were provided with a principle based content emphasis performed significantly better than subjects who were provided a procedure based content emphasis (Chia-Ling Linda, 1993; Hsu, 1993). But, Fishers (1973) found no significant differences in student performance on French/Kirundi version of the mathematic tests. Pomjít, (1991), also found no significant interaction between the methods i.e. conventional instruction supplemented by electronic learning aids versus conventional instruction without learning aids and the level of field-dependence. Like wise, Hsiao, (1999) also revealed no statistically significant difference among the deductive, inductive and alternative combined approaches and their relationships with both analytical and holistic cognitive styles on Spanish II Class at the university of South Alabama. The results further revealed that there was no significant interaction disclosed between treatments and either FD/FI or rational versus experiential aptitude style. The study demonstrated the importance of prior knowledge in predicting grammar-learning outcomes and concluded that foreign language teachers should pay special attention to this issue and may consider providing remedial instruction by viewing the previously learned material before teaching new material.

However, a separate study conducted by Marianas, (1999) on technology in mathematics instructions on four elementary education majors revealed that people with high spatial-and field-independent abilities do well with their logo interactions in problem-solving and that field-independence allowed the individuals to simplify a difficult task into sub-providers as in logo. The study
concluded that this strategy allows the individual to concentrate on the
calculation and changes that are necessary to complete the task. Cakan, (2000)
investigated the interaction of cognitive style and assessment format (Multiple-
choice-MC and Performance Based Assessment-PBA) in second language
proficiency for Eighth grade students. Phase I consisted of a quantitative study
investigating performance difference between FD and FI students on different
test formats. Phase II consisted of a qualitative study to investigate assessment
preferences and study habits of FD and FI students. Results revealed that
cognitive style had a statistically significant effect on student performance
whereas the effects of gender, ethnicity and socio-economic status of the
students were not significant. A two-factor split-plot analysis revealed a
significant interaction of cognitive style and test format. Field independent
students outperformed FD students in the MC, but no indication of such
difference was observed for the PBA. Furthermore, FD students scored better on
the PBA than they did on the MC and the FI students scored better on the MC.
Overall, the study concluded that compared to multiple choice format, the
performance based assessment of second language proficiency is less impacted
by student attributes such as cognitive style, gender, ethnicity, and socio-
economic status. Qualitative interviews with students and their teachers revealed
that there are differences between study habits of FD and FI students, but no
difference was observed in terms of their assessment references.

Kirk, (2000) investigated the relationship of attitudes towards science,
cognitive style, and self-concept to achievement in chemistry at the secondary
school level. Results indicated that field independence was significantly
correlated with problem solving, academic, and laboratory achievement. It was
also true that better attitudes toward the social benefits and problems that
accompany scientific progress were significantly correlated with higher
achievement on all three academic measures in chemistry. The main purpose of
Engemann, (2000), was to determine whether or not any relationship exist
between chemistry problem-solving performance and field-dependent –
independent cognitive style, logical reasoning ability, mental capacity, age,
genre, and academic level and compared the problem-solving strategies
employed by novice advanced novices, and experts in chemistry. Analysis of
variance conducted to look for significant effects of academic level in field-
dependent – independent cognitive style provided evidence of a significant
relationship between mental capacity and academic level (.01). A multiple
regression analysis further reported that problem-solving performance is related to an interaction between logical reasoning ability and mental capacity.

Various researches on cognitive style field dependence/independence have established their influence on learning and student's learning outcomes across academic discipline and at all levels of schooling. Field-Dependent learners generally perform less well than Field-Independent Individuals in most instructional environments (Hall, 2000). The consequences of cognitive style differences have not been thoroughly pursued by geography educators (Hall, 2000), and field dependent learners are generally disadvantaged.

**REVIEW OF RESEARCH STUDIES ON SELF-ESTEEM**

Gail Dusa NCSE, 6641, Leyland Park Dr. San Jose, CA 95120, (1993) conducted a detailed study on self-esteem at Silver Creek High School in San Jose, California. Freshman class was divided into three groups. Teachers who adhered to three operating principles taught the self-esteem group (93 students).

**Teachers:**
- treated all students with unconditional positive regard,
- encouraged all students to set and achieve goals, and,
- encouraged all students to be all they could be.

In addition, the group participated in a 40-minute activity to build self-esteem every second Friday throughout their freshman year.

The control group (also 93 students) received no treatment but was monitored along with the self-esteem group for four years.

The third group was not involved in the study. At the end of the four years, Dusa's findings were as follows:

<table>
<thead>
<tr>
<th>Event(s)</th>
<th>Self-Esteem Group</th>
<th>Control Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Days of Absenteeism per Semester</td>
<td>1%</td>
<td>16%</td>
</tr>
<tr>
<td>Percentage of Students who completed 90% or more of their home work</td>
<td>75%</td>
<td>25%</td>
</tr>
<tr>
<td>Percentage of students who participated in 20 or more extra-curricular activities.</td>
<td>25%</td>
<td>2%</td>
</tr>
<tr>
<td>Percentage of class offices held by groups between freshman and senior years.</td>
<td>75%</td>
<td>0%</td>
</tr>
<tr>
<td>Percentage of students who graduated from high school.</td>
<td>83%</td>
<td>50%</td>
</tr>
</tbody>
</table>
Woofolk, (1993) concluded that when teachers use ten steps set by Canfield, (1990) in their classrooms, the improvements in students' self-esteem and achievements are rewarding.

McCallum, (1999) conducted a study on the impact of self-esteem, study behaviour, attendance type of graduation and demographic variables on students' performance in remedial reading. The results of the study showed that students' study behaviour was the most significant variable affecting their performance in remedial reading. Self-esteem was also highly correlated with performance in remedial reading. The results further showed that, contrary to expectations; students generally began the remedial reading programme with a high self-esteem. However, by the end of the semester, their self-esteem scores had dropped. Additionally, the study further found that despite the fact that students had scored well on short-term study behaviour items on the Study Behaviour Inventory (SBI), they generally exhibited poor academic confidence, and poor long-term study behaviour. This suggests that they will eventually fail courses and drop out of college.

Quantitative investigations examined the perceptions of the low-achieving English as Second Language (ESL) students of their language learning at the National University of Malaysia (Shah, 1999). This study further assessed the patterns of interactions from the views that these students hold their ESL learning experiences as related to attitude / motivation, socio-cultural influences, formal instruction, language education policy, and their own individual characteristics. The major findings of the study revealed that the elements of ineffective instructional practices had an influence on the students' ESL low-achievers and academic achievement. The factors affecting students' achievement were:

- **Attitude / Motivation**: (Which included lack of):
  - ♦ positive attitude,
  - ♦ instructional motivation, and,
  - ♦ minimal effort

- **Socio-cultural factors**: (Which included the following):
  - ♦ negative peers' reaction and behaviour,
  - ♦ lecturers' practices, and,
  - ♦ community influence.
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Individual Characteristics: (Which included):

- personality traits (introverted and non-risk takers, and low self-esteem),
- language aptitude,
- high anxiety, and
- insufficient and inappropriate strategies

Formal Instruction: (Which included the following):

- ineffective instructional practices,
- unfavourable classroom,
- unsuitable lesson time, and
- large class size.

Language Education Policy: (Which included the following):

- unclear policy,
- unjustifiable policy, and
- ineffective policy.

Pliner, (1999) examined how entering and exiting college students with Learning Disabilities (LD) understand and make meaning of themselves as Learning Disabled (LD) and found that the process of being labeled LD with its subsequent attachment stigma negatively affect ones' self-esteem and self-acceptance. Another separate study conducted by Zhong, (1999) sought to identify the factors influencing Chinese women's education using Bronfenbrenner's ecological theory as a frame-work and other instruments like the Culture Free Self-esteem Inventory. Structural equation modeling further explored the cause-effects of the five variables (Parental educational levels, social support, Parental educational expectations, the respondents' self-esteem, and Previous academic achievement) on educational aspirations.

The findings of the study revealed that women's education in China was influenced by the joint effects of the four ecological systems, and that parental influence extended the most important influence on the respondents' educational aspirations.

Thurman, (2000) examined the relationship between self-esteem, academic self-concept, and academic achievement among African American Fifth through Ten grade students in a predominantly white, middle class sub
urban school district. Results from the students interviewed revealed that the determinants of self-esteem, in relation to African American students, are not associated with academic achievement, but rather, relate to peer acceptance, participation in sports or other non-academic factors. Brown, (2000) wanted to know what happens during peer editing activities and peer interaction of Eighth grade student writing exercise. A second purpose was to describe the interaction among students in a middle school language arts classroom where peer editing exists. Third, the study would add to past research about the effects of peer editing on student writing. Additionally, the researcher wanted to see if the findings would point to the effects that audience and response may have on students' writing and students' attitudes toward writing.

The following conclusions were made concerning peer editing:

- The collaborative forms of peer editing (engagement) can foster discovery or inquiry learning of basic concepts and other issues related to writing,
- Peer editing can help underachieving groups of children overcome their motivational deficits
- Peer editing favours students' personal growth by improving their attitudes toward others, enhancing self-esteem, and providing them with constructive social experiences,
- Peer editing aids the teachers' effort to provide individualized learning experiences for their students, and,
- Peer editing allows students to communicate effectively about writing and the components of writing.

An evaluative case study was conducted to analyse two programmes, with a focus on algebraic thinking in grades Two through Seven, (DeMille, 2000) designed to assist teachers with overcoming the cognitive, affective, and behavioural barriers to initiating changes in mathematics education. This study assessed the programmes' effectiveness in increasing teacher knowledge and lowering mathematics anxiety. The study revealed that teachers were ready to implement changes with students and then, with practice, would be willing to share what they had learned with colleagues. Teachers valued personal growth along with higher self-esteem and showed significant decrease in mathematics
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anxiety levels after participating in the programme. The study also found that students were more engaged and enthusiastic, and less intimidated as they experienced greater success with higher levels of mathematics. Changes in teacher behaviour created a transfer of knowledge and enthusiasm to the students that was reflected in significant improvement in matched-case student test scores for teachers in the sample group.

But, a study conducted by Castro, (2000) which explored self-esteem and ethnic identity of Mexican American immigrant children in Third through Fourth grade bilingual education found no significant differences in self-esteem scores between children in bilingual education when compared with those in English only classroom.

Saw, (2000) concluded that students diagnosed with Attention Deficit Hyperactivity Disorder (ADHD) showed decreased functioning in several areas of college adjustment, as well as lower levels of self-reported social skills and self-esteem. The overall results suggested that the impact of ADHD on college adjustment was only partially mediated by reported levels of social skills and self-esteem.

REVIEW OF RESEARCH STUDIES ON LEARNING OUTCOMES

In a research review, the importance of students' efforts and involvement in their academic and curricular activities as the decisive elements in promoting positive learning outcomes has been emphasized (Davis, Todd and Patricia, 1994). As schools have struggled to extend opportunities, an accompanying expectation for students to assume responsibility for their own education often has been lacking (Pace, 1990; Davis, 1994). Students can contribute to their own learning and to the development of a learning climate in which they can all grow and learn if schools can create a climate in which all students feel welcome and able to fully participate in the process of learning. This calls for proper management and use of such school facilities as classrooms, libraries, residential halls, student unions, athletic facilities, libraries and studio galleries (Pace, 1990). Learning outcomes are tied to the effort that students put into their work and the degree to which they are involved with their studies and school life (Kuh, 1991; Pascarella, 1991; Astin, 1993; Maneir, 1993).
Outcome based education focuses educational practices by ensuring that student master those learning outcomes and it asserts that all students can succeed (Maneir, 1993; Pedego, 1994).

Hoadley, (1999) examined what students in the middle school science course learned through on line peer discussion through cognitive accounts of collaboration stressing on interacting with ideas and socially situated accounts stressing on the interpersonal context. Results indicated that there was a large effect of discussion group on learning outcomes which is not reducible to group composition or gross measures of group process. Experimental manipulations in the types of social cues available to students suggest that many students do use socially relevant representations to support their understanding of multiple viewpoints and science reasoning.

But, a study conducted by Garatti (1999), on the interplay among second language (L2) modes of syntax presentation, learners, abstract reasoning abilities (Induction and deduction), IQ and instructional preferences on 66 beginner students of Italian students studying at a US State University revealed that differences in instructional modes did not result in differences of achievement or transfer of the rule. Example Based Group Inductive Reasoning significantly related to achievement and transfer. Other evidences from the study indicate that there were no discrepancy between students' understanding of the rule and its actual implementation. The findings from the self-reports also indicated that students vary on both examples and rules when instantiating rules, even when only examples or rules are provided during instruction.

Miller, (2000), examined mathematics knowledge of pre-service elementary teachers within the context of a course designed to be consistent with mathematics reform. The findings of the study indicated that students needed to experience learning mathematics within a course structure that was constant with reform. Most students identified school experiences and teachers as the primary source of their beliefs about mathematics. Finally, the study showed that the course was effective in increasing the three types of mathematics knowledge in changing some students inhibiting beliefs and attitudes regarding mathematics, and in reducing mathematics anxiety.

Kong, (2000), studied student’s engagement in the process of mathematics learning and its effects on learning outcomes. Three constructs,
(behavioural engagement, cognitive engagement and affective engagement) were identified. By the use of classroom observations and follow-up interviews, results indicated that student engagement in mathematics curriculum vary not only quantitatively but also qualitatively. With path analysis, it was found that students' behavioural engagement was closely associated with performance in computative and simple problem solving. Cognitive engagement and affective engagement were closely associated with performance in the open-ended problem-solving. Cognitive engagement and affective engagement were also significantly correlated with each other.

Kong Qiping, (2000) concluded that student’s engagement in the curriculum has great influences on students’ performance in various mathematical tasks and such results have implications on curriculum implementation too.

Brogan, (2000) and Kong, (2000) also evaluated student achievement and attitudes using different learning modes to understand how applications of technology based learning approaches can be improved to address several contemporary issues regarding learning outcomes. Using multiple methods, the study compared three different learning models used with college age students at the Dallas Country Community College System. Results included evidence that computers can deliver successful learning outcomes based on pass rates and grades, as well as student satisfaction. Strong linkages between attitudes and successful learning outcomes got the need to focus on enabling positive attitudes. Implementation issues can play a key role in influencing outcomes and attitudes. Another major finding in the study is the need to reframe our views of successful learning outcomes, a way from grades and pass-rates and towards assessing successful attainment of learning goals.

Simmering, (2000) also studied the effect of learner control and individual differences on learning outcomes on 189 grammar skills on students and writing assignments. Results of this study indicated that mastery oriented individuals were more motivated to learn. Additionally perceptions of the legitimacy of training were related to motivation to learn and were moderated by the amount of learner control in training. A predicted relationship between motivation to learn and learning was not found different with self-report measures of motivation to learn. However, two unobtrusive measures of motivation to learn were positively
related to training and finally, learning was significantly related to transfer of training.

Anchuthengil, (2000) investigated the effect of learning styles (based on Kolb’s experiential learning theory), learning environments (synchronous interactive television) and student achievement of physical therapy, on students enrolled in distance education. The results indicated significant interaction effect between two independent variables. Simple main effect analysis of interaction reported a positive effect of learning environment at diverger and assimilator learning style types and no effect for converger and accommodator types. The research concluded that the information generated would expand the knowledge base of learning styles and its relationship to learning environment on student achievement of physical therapy graduate students. The research findings of the study supported faculty development programs designed to increase awareness of learning styles differences and equip faculty to meet the diverse learning needs of the students.

But other researches conducted on learning the cognitive load of discovery learning of students did not find any significant difference in learning outcomes despite differences in prior experiences with databases (Tuorinen, 2000).

The study therefore concluded that discovery learning (i.e. exploratory practice) is not as useful for students with minimal prior knowledge studying high element interactivity material as a worked examples approach, but if the students have good prior knowledge, the two formats of instruction are equivalent (Tuorinen, 2000).

EMERGENCE OF THE PROBLEM

Despite of great advances in knowledge, students learning, and tremendous amounts of investments involved in terms of time, effort, and money, our schools today still have not progressed towards the goal of efficient learning for all the students. Usually, students left alone on their own often make very little progress in learning. Students fail so often and so universally that some people are convinced that failure is an essential and inevitable aspect in the education sector. Failure however, often produces harmful consequences that work against the goals of education.
In any learning situation, students who spend little time on learning tasks will learn very little. In this way, rewards and punishments are sometimes used with the objective of keeping students on the track of learning though the effect is often not what is anticipated. And many a students who receive repeated and consistent evidences that their work was unsatisfactory have been convinced that school was a place where they could not succeed. When sincere attempts to teach and to learn meet with repeated negative responses, the instructional process can actually eliminate those activities that are essential to productive education. However, if students are to earn positive evaluations and at the same time experience success in the classroom, they must demonstrate competent academic performance, including mastery of educational tasks.

In mastery learning situations, the acquisition of the subject matter involves a chain of learning in a way that no single link could be broken out without all subsequent links being lost. Each student needs access to instruction appropriate for his own level if he is to obtain a maximum benefit from the time he spends in school where instruction in basic skills and knowledge continues until he has developed adequate competence. Whenever the student does produce good work, he needs to receive some evidence that his performance is good. Such evidence is a benchmark indicator to the student, to his teachers, parents, and to his classmates and peers that he is capable of performing well in school.

The different methods and techniques for imparting instruction in a formal classroom setting has been continuously changing in which the old ones were replaced by the new ones. This activity has not come to an end today and different researchers are going on to devise still newer approaches of instruction. The motivation behind these efforts has been the need and desire to devise a strategy which when used in the classroom situation will help to produce desirable changes in the learners’ behaviour. So, there came a change in the thinking that all can learn well under a set of certain conditions. The change in thinking has revolutionized, in a way the whole concept and process of teaching in the classroom. The concentration of the teacher now is not only limited to a small section of students, rather, takes into its fold all the students in the class since all mastery learning strategies are based on this principle.
A critical review of the literature in the field of mastery learning reveals that little work has been done to examine the conditions under which mastery learning is more or less effective and the limits of student learning through the mastery learning approach.

Mastery learning is a Group Based Teacher Paced (GBTP) Approach. Students learn co-operatively with their classmates and the teacher controls the delivery and flow of instruction.

For the purpose of the present study, only Bloom's Group-Based Mastery Learning Strategy (B-MLS) was used. Within Bloom's MLS, instructional plans were designed by using Advance Organizer Model for the initial instruction. Two kinds of Advance Organizers viz: Generalization and Analogy were compared through Bloom's Mastery Learning Strategy (B-MLS). So, the present study has been designed to investigate Mastery learning situations with Generalization and Analogy as advance organizers and their impact on learning outcomes on High School students in relation to their cognitive style.

STATEMENT OF THE PROBLEM

The present study is entitled:

“Mastery Learning Situations With Generalization And Analogy As Advance Organizers And Their Impact On Learning Outcomes On High School Students In Relation To Their Cognitive Style”

DELIMITATION

The study was delimited with respect to the level of students and their subject areas. The present study was confined to Mastery Learning Strategies (MLS) with Generalization and Analogy as advance organizers. Within the constraints of time and resources, the investigator worked on IX grade students in the subject of Social Studies (Geography). Out of the entire Social Studies (Geography) syllabus, a segment of Geography course was used for the purpose of the present investigation.
OBJECTIVES

The present study has been designed to attain the following objectives:

1) To develop instructional material based upon Mastery Learning with Generalization and Analogy as advance organizers (ML-GEN and ML-ANAL).

2) To study the effectiveness of ML-GEN and ML-ANAL in comparison to Conventional Group Learning (CGL) in respect of academic achievement.

3) To study the achievement of IX graders in relation to cognitive style.

4) To study the two order interaction effects of ML instructional strategies and cognitive style on academic achievement.

5) To study the effectiveness of ML-GEN and ML-ANAL in relation to self-esteem.

6) To study the impact of cognitive style on self-esteem of IX graders.

7) To examine the effectiveness of the above-mentioned treatments (ML-GEN; ML-ANAL; and CGL), on self esteem in relation to cognitive style.

HYPOTHESES

➢ Ho1: There is significant difference in the means of Standard Progressive Matrices (SPM) scores of IX grade students.

➢ Ho2: There is significant difference in the means of high, average, and low groups on Entry Behaviour (EB) scores of IX grade students.
   ✦ Ho2(a): High and average groups are different on EB scores.
   ✦ Ho2(b): High and Low groups are different on EB scores.
   ✦ Ho2(c): Mean scores on EB of Average and Low groups are different

➢ Ho3: Levels of pre-criterion scores of students are equal.
   ✦ Ho3(a): High and Average groups are not different on pre-criterion percentage (PCTP) scores.
   ✦ Ho3(b): High and Low groups are not different on the basis of pre-criterion percentage (PCTP) scores.
   ✦ Ho3(c): Mean scores of pre-criterion test of Average and Low groups are not different.

➢ Ho4: There is significant difference in the means of Entry Behaviour scores classified on the basis of their cognitive styles.
   ✦ Ho4(a): FD and FI groups exhibit different means on cognitive scores.
Ho4(b): There was sufficient representation of both types of cognitive style Field-Dependent and Field-Independent (FD/FI) in the three treatment groups (ML-GEN, ML-ANAL, and CGL).

Ho5: The instructional treatments yield equal level of learning outcomes as measured by achievement scores.

- Ho5(a): ML-GEN groups and ML-ANAL groups yield comparable achievement gain scores.
- Ho5(b): ML-GEN groups and CGL groups yield comparable achievement gain scores.
- Ho5(c): ML-ANAL groups and CGL groups yield comparable achievement gain scores.

Ho6: The different cognitive styles, Field-Dependent and Field-Independent (FD/FI) result in equal levels of learning outcomes as measured by achievement scores.

Ho7: The differences in learning outcomes as measured by achievement gain scores through ML-GEN; ML-ANAL; and CGL are not qualified by levels of cognitive style;

For Instructional Treatments: (ML-GEN, ML-ANAL, and CGL):

- Ho7(a): Through ML-GEN: Field-Dependent and Field-Independent (FD/FI) cognitive styles yield almost equal gain means on achievement scores;
- Ho7(b): Through ML-ANAL: Field-Dependent and Field-Independent (FD/FI) cognitive style yield almost equal gain means on achievement scores.
- Ho7(c): Through CGL: Field-Dependent and Field-Independent (FD/FI) cognitive style yield almost equal gain means on achievement scores.

For Cognitive Style Field-Dependent / Field-Independent (FD/FI) Groups:

- Ho7(d): For Field-Dependent (FD), Learners gain means for:
  - ML-GEN and ML-ANAL are not different;
  - ML-ANAL and CGL are not different;
  - ML-GEN and CGL are not different.
- Ho7(e): For Field-Independent (FI), Learners gain means for:
  - ML-ANAL and ML-GEN are not different;
  - ML-ANAL and CGL are not different;
  - ML-GEN and CGL are not different.
**Introduction**

- **Ho8:** The three instructional treatment (ML-GEN, ML-ANAL and CGL) yield equal level of learning outcomes as measured by gain scores of self-esteem.
  - **Ho8(a):** (ML-GEN), and (ML-ANAL) exhibit equal level of self-esteem gain scores;
  - **Ho8(b):** (ML-GEN), and (CGL) exhibit equal level of self-esteem gain scores;
  - **Ho8(c):** (ML-ANAL), and (CGL) exhibit equal level of self-esteem gain scores;

- **Ho9:** Two cognitive styles Field-Dependent / Field-Independent (FD/FI) do not result in equal levels in learning outcomes as measured by self-esteem scores.

- **Ho10:** Cognitive style and instructional modes do not interact with each other to yield significant different learning outcomes.
  - **For Instructional Treatment: (ML-GEN; ML-ANAL and CGL):**
    - **Ho10(a):** Through ML-GEN: The two cognitive style groups Field-Dependent and Field-Independent (FD/FI) yield almost equal gain means on self-esteem scores;
    - **Ho10(b):** Through ML-ANAL: Two cognitive styles Field-Dependent and Field-Independent (FD/FI) do not differ in their gain means on self-esteem scores;
    - **Ho10(c):** Through Conventional Group Learning (CGL): Field-Dependent and Field-Independent (FD/FI) yield equal gain means on self-esteem scores.
  - **For Cognitive Style Field-Dependent/Field-Independent (FD/FI) groups:**
    - **Ho10(d):** For Field-Dependent (FD) learners gain means for:
      - ML-GEN and ML-ANAL are not different;
      - ML-ANAL and CGL are not different;
      - ML-GEN and CGL are not different.
    - **Ho10(e):** For Field-Independent (FI) learners gain means for:
      - ML-ANAL and ML-GEN are not different;
      - ML-ANAL and CGL are not different;
      - ML-GEN and CGL are not different.