CHAPTER - I

INTRODUCTION
CHAPTER - I

INTRODUCTION

The present era is passing through a phase of revolutionary changes imposed on society and social system by technological and scientific upheaval. These changes in the structure of society initiate rather necessitate changes in the working of social systems. School plays an important role in the process of socialisation and society, through education, achieves its goals. The present educational system throws a challenge to teacher to play a multiple and dynamic role keeping pace with the constantly changing world.

This is an era of speed, change, instability and lack of permanency. The solution to yesterday's problems often become invalid today. Textbooks, teaching methods and content become obsolete within a short period of time. Such a situation demands a flexible teaching-learning process: A process which can be adapted to the changing needs and demands of the individual and society.
Teaching-learning process can be viewed as a tripolar process, involving teachers, learners and content. This process can be dominated by any one of the three components. If it is dominated by teacher, it is called teacher dominated or teacher-centred; if students are more active and make certain decisions for themselves then the process is said to be learner centred and if the content weighs more than the process is termed as subject-matter centred.

In teacher-centred learning, teacher plays an important role and pupil remains generally a passive listener only. During the period of early Greek philosophers like Aristotle, Plato, Socrates and Indian saints of Vedic period, the learning was more or less teacher-centred. In lecture method and demonstration method, the teacher transmits ideas and the students passively accept these ideas.

In student-centred learning, the student role is more significant than the role of the teacher. The student is pivotal of all activities. In penal discussion, symposium, debate, interview, role playing, the student is more active than the teacher. The teacher is just a friend, philosopher and guide. The student participates in an activity and learns by taking help from many sources like teacher, parent, his classmates, mass-media, society or community.

Subject-matter centred learning is another kind of learning, in which, the emphasis is on the subject-matter rather than on
teacher or learner. In programmed learning, project method, radio-programme, Television programme, computer-programme, dial assess material and telephones, slides, tapes, holography, correspondence-course materials, 'Sesane' Street experiment and 'The Electric Company' experiment, graphic media, three-dimensional material, maps and globes are very effective media or techniques to impart learning to the student.

All the above three types of learning may be acquired by two types of instructional procedures:

- Group Methods of Instructions; and
- Individual Methods of Instructions.

**Group Methods of Instructions**:

Most of the conventional instructions are group methods of instructions. These group methods mainly contain lecture method, discussion method, project method, debate, role-playing, and demonstration.

Lecture method is one of the oldest method of group teaching. James Michel Lee (1915) quoted, "The lecture is a pedagogical method whereby the teacher formally delivers a carefully planned expository address on some particular topic or problem".
In discussion method, teacher and student or student and student frankly talk over some problem or topic. Panel discussion, symposium and debate are three types of discussion method.

**Individualized Methods of Instructions:**

Individualized instructions mean adopting instructional material and techniques to the individual differences found among learners. It means shaping instructions to the need of learner, style of learning and the requirement of subject-matter. Some of the programmes, techniques and mass-media which are used for imparting individualized instructions or personalized system of instructions are briefly discussed below;

**Programmed Instructions:**

In programmed learning, material may be verbal, printed or in pictorial form and can be conveyed through any medium. It involves breaking up the material to be learnt into a number of small steps known as frames or didules which may be presented in logical or scrambled form. Among four different styles of programming, the most frequently used are linear programming and intrinsic programming.

Branching or intrinsic programming was developed by NA. Crowder (1954). In this style of programme, the student is presented with a problem and with alternative answers to it; one of which is
correct. After going through the problem, the student chooses an answer; then he is instructed to move to a specified page. This page tells him whether he was correct or incorrect. If he is right, the response will be reinforced. If he is wrong then the frame explains why he is incorrect. The student may be asked to return to the original item for another trial. A similar procedure is followed till he chooses correct answer.

The main features of branching programme are as given below:

- A frame is large and therefore it contains much information in it and is generally called an exercise.
- Learner is free to choose his own path.
- Learner is more alert and concentrates on the subject-matter more carefully.
- Detection and correction of error is emphasised.
- It is a learner controlled programme.
- Learner is expected to make a covert response.

Branching Programme has some good features but is also having the following limitations:

- Guessing of correct response is possible.
- Infinite branching cannot be provided. It cannot cater to the need of all individuals because it is very difficult to find out the large number of branches for every individual.
- The cost of preparation and execution is high.
- The programme needs revision after every two or three years.
- Level of content and diagnostic questions are decided by the programmer which may or may not suit the learner.
- It is very difficult to use this type of programme on primary classes upto grade V.
- Sometimes the important subject-matter is left out without being tested.
- The learner may reach the last frame without going through the whole programme thoroughly.
- This technique does not shape the behaviour of the student the way a programme should.

The linear style of programming was developed by Prof. B.F. Skinner of Harvard University during 1950's. This is also called the Skinnerian style of programming. The techniques associated with this style of programming are based on the principle that the learner's original response should be gradually altered or shaped until he meets some standard of acceptable performance. According to him, the best way to teach student is to break the subject-matter into meaningful segments of information and write those small segments in such a way that only the correct responses are likely to occur. Immediate feedback helps the student to learn the content-matter in a better way. He should actively
participate in the learning process by constructing responses. Skinner believed that recall responses (constructed responses) are more efficient in learning process than recognition type responses. The reinforcement of desired response increases the probability of the same response to recur in future. When the principle of chaining (S-R) is applied to human being it operationally works as a learner is presented with a small amount of information and is asked to answer a question. As soon as he responds, he is shown the right answer which serves as a reinforcer. Thus, by continually reinforcing the behaviour of the learner, we can lead him to the desired goal.

In linear programming, the learner starts from his initial behaviour to the terminal behaviour following the straight-line sequence:

- Responses are controlled and emphasised.
- There is immediate feedback.
- Sometimes hints, cues or prompts are introduced to avoid unnecessary wastage of time to find out correct response.
- Active participation of the learner takes place.
- Self-pacing principle is fully met.
- It is very good even for small children.
- In linear model, the learner has to construct his responses.
- Cheating is discouraged by hiding the responses from the learner by means of some mechanical device.
The above programme also has the following limitations:

- It lacks intrensic motivation.
- There is no freedom of choice.
- Sometimes the learner finds out the clues.

Mathetics is another type of programmed learning. It was developed by Dr. F. Gilbert in 1962. He defined mathetics as "the systematic application of reinforcement theory to the analysis and reconstruction of those complex behaviour repertoires usually known as subject-matter mastery, knowledge and skill. Methetics, if applied diligently, produces teaching materials that exceed the efficiency of the lessons produced by any known method". We can link the results to concrete goals which we intend to achieve through a mathetical programme. Mathetic is a task and job oriented technique. It is relevant, meaningful, significant and valid in the eyes of the learner and the trainer.

Lastly, it also emphasises upon student success at 90/90 criterion level of mastery means that the student is constantly motivated and reinforced by the consequences of mastering the knowledge or skills that he wishes to obtain. It suits best for skill development. Mathetical programmes have been developed in the areas of psychomotor skills such as barbering, welding, bricks-laying, electrical appliance repair, radio-TV repair, sewing, automobile servicing and technical writing where the main emphasis was on transfer of skill.
Characteristics of Mathetics are as follows:

- Layout and response are flexible.
- Extensive use of illustrations and simulators is done.
- Large teaching step size are used.

Disadvantages of Mathetics are as follows:

- It is time consuming.
- It is highly complicated process.
- Fabrication cost is high.
- Backward chaining is sometimes very difficult to apply in actual training situation.

**COMPUTERS**:

The computers now-a-days are used for -

- Drill and practice.
- Tutorial and Dialogue.
- Simulation and gaming.
- Aid for information handling.
- A subject of instruction in itself.

PLATO IV, PLAN and Patrick Suppes's "Drill and Practice" are fully computer based instruction systems. IBM, GE, RCA, Philco-Ford, CDC, COBOL, Microcomputer etc. are different types of computers.
Correspondence Text:

Most of universities have started correspondence courses. Lesson notes with home-assignments and response sheets are mailed to the students. The student, after going through the contents of the lesson, sends back the response sheets and home-assignments to the tutors who evaluate them, and suggest and guide their students. Students attend resource centres and the contact programmes. Correspondence courses have been proved as effective as regular courses.

Some of the other personalized system of instructions used are visual literacy, three dimensional material, displays, community studies, maps and globs, audio-recording and play-back, audio-cued learning, still projectors, micro-processor boom, motion picture film etc.

1.1 REVIEW OF RELATED STUDIES:

Many research studies concerning effectiveness of modes of instructions involving individualized and group methods have been conducted in the past. A critical review of the relevant studies to the present study have been given below:

Methods of Instructions as related to Achievement:

Under this heading research studies conducted to see the
effectiveness of various modes of instructions on academic achievement have been reviewed.

High (1975) revealed that the individualized laboratory approach significantly improved the mathematics achievement of underachieving third grade students.

Sonar, M.S. (1975) conducted a study and concluded that use of film strips in teaching science indicated the possibilities of improvement in the methodology of science teaching.

Kornbluth (1979) found field dependent-independent students together in the individualized study method perform better than field dependent-independent students in the group method.

Adam (1980) found that attrition was significantly high in personalized system of instructions than lecture method.

Chimerhanzel (1980) found that in individualized approach students have greater ability to write, read, comprehend, communicate and have more positive attitude towards learning Spanish than those students who had experienced a lecture recitation approach.

Edgar (1980) concluded that the students generally scored higher on a mathematics and reading post-test when instructions were supported by computer instructional management system.
Montiel (1980) found that students achieve better in terms of subject-matter content mastery when taught with psychological strategies using a personalized system of instruction mastery based model.

Parke (1980) resulted that the high achieving students, taught through the self-instructional system, make greater gains than directive teaching instructional management system.

Aiello (1981) revealed that individualized instruction in science is somewhat more effective than traditional instructions.

Jersey (1981) revealed that the activity centred group performed significantly better than the teacher-centred.

Logne (1981) found that slide tape presentation was more effective than film strip. Student preferred slide tape presentation over printed and illustrated teaching material. The students showed least interest in lectures.

Locket (1981) revealed that instructional television was an effective tool in teaching abstract concepts. It benefitted low achievers more than the high achievers.

Tarrant (1982) concluded that high motivation and interest in computers may make it easier to take advantage of drill and practice programmes for the disadvantaged learners. Computers may be of good use as an aide or an alternative for individualized programme for students.
Austin (1983) found that a computer assisted instruction lesson was effective for teaching a geometry concept attainment exercise.

Bradley (1983) concluded that computer assisted instruction has been effective in mathematics, science and social studies. This showed improvement in achievement for both male and female using computer-assisted instruction to study American history.

Dursky (1983) found that computer assisted instruction is at least as effective as programmed text for teaching Latin and Greek derivatives.

Elg Thomas (1983) found that the computer simulation experience in study seems to have provided a cognitive routine which the students could apply to the learning of problem solving.

Heilman (1983) revealed that computer simulation practice helped students reinforce rule-using behaviours as well as increase verbal learning.

Vezquez (1983) showed that computer assisted instruction was effective in Chemistry, Science achievement at secondary school level.

In the above listed studies, the individualized system of instructions was found to yield higher achievement scores than group methods. However, the studies reported below showed either non-significant differences or significant differences in favour of group instructions.
Chandrakala (1976) revealed that programmed instructions, lecture method and traditional methods were equally effective in terms of student performance. Average achievers learnt better than high and low achievers through programmed instruction. High achievers learnt better than average and low achievers through lecture method and traditional method.

Johnson (1979) concluded that self-paced individualized instructional practices are not superior to traditional instructional practices.

Hunt (1980) found no observable differences in computer managed instructions and non-computer managed instruction classes in respect of achievement of the students.

Klavs (1981) found the achievement of elementary students better when taught by individually guided education programme than by non-individually guided education programme but no difference was observed on student of grade four when taught by the above two techniques.

Mager (1981) found the need of proper mixing of individualized instructions and group instructions.

Bogue (1982) concluded that high imagers earned higher achievement from the verbal rather than the film presentation and pictorial aids better served the low imagers.

Lovelace (1982) established that there appears to be no evidence to support either the programmed text or the computer
assisted instructions treatments as being superior method of instructions.

Lee, Charles (1983) concluded that slides did not affect achievement.

King (1979) revealed that tradition method of instruction tended to achieve generally better results on the academic performance of college freshman.

Damerow (1982) concluded that lecture plus print was the most effective treatment and lecture plus film was nearly as effective. Film media alone was least effective.

Levy (1982) found that the traditional reading method was more effective than perspective method and computer assisted method.

Shaw (1982) revealed that the whole class mode was better than the individualized mode.

Newman (1983) revealed that on high school level all the three methods namely traditional classroom, computer and programme instructions could be used successfully and programmed instruction was most successful in bringing the performance of the three activity levels together.

Programmed Learning Material and Achievement:

Fry (1963) maintained that programmed instruction is
capable of teaching all educational objectives in cognitive domain listed by Bloom.

Lankford (1964) found that programmed instructions can teach both knowledge of specifics and the use of such knowledge.

Noble (1969) concluded that intrinsic programmed instructions were capable of teaching in the area of knowledge and comprehension but not of analysis and synthesis.

Pandya, N.L. (1974) revealed that the learning through programmed material benefited the students with high, average and low intelligence level.

Sharma (1974) found that branching programme was effective for comprehension and application categories whereas the linear programme was effective for knowledge.

Patal, C.B. (1975) concluded that programmed learning material proved to be more effective than the conventional methods. High and low groups performed better with programmed learning material than with conventional method.

Reddy, N.Y. (1975) concluded that the mean performance scores of the experimental group on all the four programmes viz. linear, branching, mathetic and language programme were higher than that of controlled group taught by conventional method.

Kuruvilla, R. (1977) concluded that eighty percent of the students who had learnt through different types of programmes had
scored eighty percent or more. Branching form of the programme was significantly more effective than other forms when student performance and time was taken as criterion.

Patel, A.D. (1977) concluded that programmed learning material was found to be effective for all pupils.

Sodhi, G.S. (1977) found that branching programme was superior to lecture method in terms of total achievement and categorywise achievement. Linear programming was superior to lecture method in respect of overall achievement. Intelligence partly facilitated achievement and many of personality traits behaved as redundant variables but certain of them significantly correlated with achievement.

In all the above mentioned studies, programmed material had significant relation with achievement of the students. Some of the studies which reveal that programmed material is insignificant as related to student achievement, are given below:

Govinda, R. (1976) revealed that a programmed text is as effective as structured lecture. Intelligence had no effect on achievement.

Fairbrother (1980) concluded that programmed instructions is not significantly effective than employment of conventional method involving text material or lecture method.
Walker (1981) found that a conventional lecture-discussion teaching format supplemented by a programmed instructional material did not significantly improve the achievement of prospective female elementary school teachers.

Intelligence as a Correlate of Achievement:

Shay (1961) found that intelligence was positively related to post-test at .09 level of significance when taught through programmed learning.

Lambert, Miller and Willey (1962) observed that intelligence was significantly associated with immediate acquisition.

Woodruff, Faltz and Wagner (1966) reported significant correlations for ninth graders between ability measures and number of frames correct, on a programme in electricity.

Sinha, N.C.P. (1967) revealed that high and low achievers were significantly discriminated on variables of intelligence, extraversion-intraverssion and neuroticism or emotionality. Intelligence and achievement were related at .01 level. Academic achievement was found to be positive and significantly related with extraversion-intraverssion and neuroticism at .05 level.
Lalithamma, N. (1975) concluded that achievement in mathematics was positively related to intelligence.

Seetha, B. C. (1975) found that high achievers possessed superior intelligence when compared with low and non-achievers.

Mathew, T. (1976) concluded that high achievers were in the group of high intelligence, low age and among boys. They were having total adjustment, anxiety orientation, group adjustment and self-esteem.

Marrybeth and Marry (1978) found that the correlation between intelligence quotient and achievement scores was highly positive.

In the above studies there was a positive correlation between intelligence and achievement of the student. Some of related studies having no correlation or negative correlation between intelligence scores and achievement scores are given below:

Porter (1959) found that in teaching spelling there was no significant relationship between intelligence and achievement scores of groups taught with machines, though there was a significant positive relationship between these two factors when a conventional method of teaching was used. Traditional method was better with bright students and least effective with inferior students.
Gagne and others (1962) found no significant effect of ability upon success in learning task.

Stone (1965) found that learner's characteristics were not significantly related to performance under two modes of instructions namely programmed text and conventional text format.

Guthrie (1971) concluded that the effect of intelligence on concept formation was negligible.

Personality as a Correlate of Achievement:

Barton and others (1972) concluded that the personality factor "conscientiousness" and intelligence levels predicted achievement in all areas namely social studies, science, mathematics and reading. In mathematics, adventurousness was related to achievement.

Menon, S.K. (1973) revealed that overachievers were found to be less extravert.

Verma, M. (1977) revealed that performance of extroverts was significantly higher than that of introverts through intermittent schedule of reinforcement. The introverts learnt better than extroverts through continuous reinforcement.

Content Comprehension as a Correlate of Achievement:

Murray, R.B. (1978) investigated the logical operational
comprehension on seriation stage of achievement tests. He reported significant differences in logical operational comprehension between students in grade six to twelve.

Gakhar and Behl (1979) have conducted a study in figural creativity, intelligence and achievement at two Piagetian stages of concrete thinking and formal thinking. They concluded that association between the variables of verbal intelligence, figural creativity and achievement is significant at concrete stage and shows a decreasing trend from concrete to formal operational stage except in case of figural creativity and achievement.

Tremente, Flavia and Chudia (1980) investigated the effects of logical operational comprehension on seriation stage of achievement tests. He reported significant difference in logical operational comprehension between students in grade six to twelve.

Sapra, Rooma (1985) concluded that there is no significant difference in academic achievement of students of high and low levels of thinking. There was no significant difference between the academic achievement of extroverts and introverts.

1.2 Emergence of the Problem:

A critical review of the literature in the field of instructional technology reveals that in order to learn the same content material different learners need different techniques. It has been also established that every child who is educable can
learn every thing. The difference will be in terms of time taken and strategies of learning. Bright students will master the content in lesser time while less bright students will take more time.

As each individual is unique in itself so selection of the right type of learning experience and media for making teaching and learning more effective and purposeful, is of much significance here. In order that an individual learns a content material an integrated methodology - a teaching strategies, integration of different methods, material and media suiting to the differential needs of the group should be involved. In the present study the investigator had investigated the effectiveness of different strategies of teaching in terms of achievement in the subject mathematics at school level.

1.3 STATEMENT OF THE PROBLEM :

"To compare the Effects of Individualized and Conventional Instructions on the Students Achievement in Relation to Personality Types, Intelligence levels and Levels of Thinking".

The following research questions were raised for investigation which emanated after a systematic sifting of relevant research studies:

- To compare mathematical achievement of the students exposed to personalized system of instructions to the group exposed to conventional lecture method of instruction.
- To see whether there is any interaction between mode of instructions and levels of intelligence.
- To see whether introverts and extroverts differ in mathematical achievement with respect to different modes of instruction or not.
- To know if content comprehension (thinking) levels of students affect achievement in mathematics significantly or not.

1.4 HYPOTHESES:

The present study was conducted to test the following hypotheses:

1. There is significant difference in terms of mean achievement scores of three groups taught through three different instructional strategies.
   
   (a) The mean achievement scores of the students exposed to personalized system of instructions will be significantly higher than those exposed to conventional instructions.

   (b) The mean achievement scores of the students exposed to individualized system of instructions will be significantly higher than those exposed to programmed text in branching style.
2. Ability level of the students will not significantly vary the overall achievement of the student irrespective of modes of instruction, personality types and levels of comprehension.

3. Personality types will not significantly affect achievement irrespective of modes of instruction, intelligence level and operative comprehension level.

4. Levels of thinking of students will not affect achievement ignoring intelligence, instructional mode and personality type.

First Order Interaction Hypothesis:

5. (a) The interaction effect of level of intelligence x instructional mode on student achievement will not be significant.
(b) The interaction effect of operative comprehension thinking x instructional mode will not be significant.
(c) The interaction effect of personality type by instructional mode will not be significant.
(d) Levels of personality x levels of operative comprehension on achievement will not be significant.
(e) Levels of comprehension x levels of intelligence on the achievement of the students will not be significant.

(f) Personality types x levels of intelligence on student achievement will not be significant.

Second Order Interaction Hypothesis:

6. (a) The interaction effect of instructional mode x personality type x intelligence level on the achievement of the students will not be significant.

(b) The interaction effect involving instructional mode by levels of intelligence by operative comprehension thinking levels on the achievement will not be significant.

(c) The interaction effect involving teaching strategies by personality types by levels of content comprehension on the achievement of the students will not be significant.

(d) The interaction effect involving personality types x levels of intelligence x levels of operative comprehension thinking on the student achievement will not be significant.

Third Order Interaction Hypothesis:

7. The interaction effect involving instructional mode by intelligence level by personality type by operative comprehension levels on the achievement of the students will be statistically significant.