CHAPTER II

REVIEW OF RELATED RESEARCHES

2.1 Studies on Effective Teaching Patterns Leading to the Achievement of Objectives :

(a) Western Countries
(b) India

2.2 Studies on Development and Use of PLM - Its Role as a Major Component in a Teaching Strategy :

(a) Western Countries
(b) India

2.3 Studies on Achievement through PLM and Instructional Strategy in Relation to Students' Characteristics and Their Attitude Towards the Approach :

(a) Western Countries
(b) India

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As discussed in the previous chapter, our instructional process needs to be systematised through the application of the principles of physical sciences and behavioural sciences for the achievement of various objectives. Educational studies in general reveal that research efforts have been made to find out the effective teaching patterns in terms of objectives at various levels, viz., knowledge, comprehension and application. Concentrated efforts have been made to study the suitability of programmed learning material as a sole technique of learning and as a major component of teaching strategy as well. While carrying out these experiments attempts were also made to study its effectiveness in relation to the personality characteristics of students. For the present investigation it is worthwhile to study the results and conditions under which those experiments have been conducted. Moreover, the present investigation studies the course 'Educational Evaluation' which includes topics like objective test items, construction of test, suitability of examination system, classification of objectives according to Bloom's taxonomy, qualities of a good question paper in terms of its reliability, validity, discriminating and difficulty value etc. So studies related to different aspects of evaluation are also reviewed. In reviewing the related literature on past studies, both in India and abroad, the following aspects are kept in view.

(i) Effective teaching patterns leading to the achievement of objectives (knowledge, comprehension and application).

(ii) Development and use of PLM - its role as a major component in a teaching strategy.

(iii) Achievement through PLM and instructional strategy in relation to students' characteristics and attitude towards the approach.

2.1 Studies on Effective Teaching Patterns leading to the Achievement of Objectives

(a) Western Countries :

Cohen (1977) undertook the investigation to study the influence of organizing strategies, time and grade point averages on retention performance. The relationship among retention performance, organising strategy performance and grade point average were assessed in 227 college students. Highly significant correlation coefficients suggest that the type of organizing strategy used in memorizing exerts a strong influence on the recall of paired association over both short and long periods of time. Moreover, they seem to indicate that organizing strategy performance has promise as a predictor of grade point average.

McCamey and Bullock (1977) studied the effects of differential instruction approaches upon undergraduate students. The purpose of this study was to investigate the differential

effect of (a) modularized self-paced instruction (b) modularized self-paced instruction supplemented by lectures and discussion and (c) traditional instructional approaches. Subjects in the study were undergraduates enrolled in an introductory survey course in the areas of education of children and youth with behaviour disorder. The study did not demonstrate the superiority of a modularized instruction technique supplemented by lectures and discussion over modularized instruction. It did indicate the superiority of both modularized instruction and modularized instruction supplemented by lectures and discussion over traditional instruction techniques when the subjects were given the opportunity to recycle the learning activities and post assessment.

Perez (1979) conducted the investigation to determine whether or not, there was a significant difference in students' knowledge acquisition and their ability to solve problems in dermatology when taught by three different methods of teaching viz., clinical teaching method (CLTM), case teaching method (CATM) and combined method (CLTM - CATM). The population of the study was composed of seven hundred forty-three Dermatology students of the 1977 spring semester in the University Autonoma do Gundalajora(UAG). A random sample of one hundred twenty seven was selected from the population. The results obtained were better in the courses where CATM was used, it may be

assumed that CATM produced greater motivation to seek information as more knowledge was acquired by the students. And CATM showed the same effectiveness in producing problem solving skills in Dermatology.

Pardes (1979) undertook the study to determine the effect of cognitive strategy training programme on motivation for learning. The cognitive task curriculum involved instruction in the recognition of sentence with cause - effect component. In addition to exploring the effects of training students in the use of cognitive strategies for recognition of sentences with a cause-effect component, the major thrust of the investigation was to study the relationship of cognition and motivation in the classroom. Results of the study indicated that training in the use of task processing strategies increased both the level of cognitive competence and all five components of motivation for learning in school. The conclusions derived were; (i) training in the use of cognitive task processing strategies can raise the level of task performance (ii) raising the level of task performance results in parallel improvements in the students knowledge of instructional steps, (iii) cognitive strategies are not simply an effective means of improving task performance, they are also directly related to motivation for learning.

(b) India :

In an experimental study Sharma (1972) tried to find out the relative effectiveness of four patterns of teacher classroom behaviour narration, open questions, narrow questions, and narrow questions with feedback upon pupils attainment in terms of knowledge, comprehension and application objectives. The study was conducted on pupils of standard VII social studies. It was found that pattern involving narrow questions was more effective in achieving the knowledge and comprehension objectives. No pattern was found to have any differential effect in achieving the application objectives.

Padma (1973) conducted a study for teaching patterns and pupils' achievement. The objectives of her study were to find out the effectiveness of four patterns - (i) lecturing - problem solving approach, (ii) questioning-answering-problem solving approach,(iii) questioning-answering-feedback-problem solving approach and (iv) lecturing-no problem solving approach pattern on the development of applicational ability and retention of applicational ability in science of standard VII pupils of Baroda city. Findings as reported in the study were (1) the four teaching patterns had equal effects on the development of applicational ability when measured under surprise testing condition, (2) the four teaching patterns and

equal effects on the development of applicational ability when measured under planned testing condition and (3) in the first experiment it was found that four teaching patterns had an effect on the retention of applicational ability. On further analysis it was found that the mean for pattern 3 i.e. questioning - answering - feedback - problem solving approach was significantly smaller than other three patterns.

Shaida (1976) undertook the study on the line of Sharma. His objective of study was to find out the effects of four teaching patterns - narrow questions with feedback (P_1), narrow questions without feedback (P_2), broad questions with feedback (P_3) broad questions without feedback (P_4), upon the attainment and retention of eighth class boys in social studies in terms of knowledge, comprehension, application and total scores. In order to study the effect of different patterns of teaching, the 4 X 4 Graceo - Latin square Design was selected. The results revealed that the teaching pattern of narrow questions with feedback produced significantly higher mean for the development of knowledge and its retention than all other patterns. The teaching pattern of broad questions with feedback produced significantly higher mean than the remaining other two patterns. The teaching pattern of broad questions with feedback produced significantly higher mean for application and its retention than all other patterns. The teaching pattern of broad questions with

feedback did not produce significantly higher mean for total attainment than other patterns.

Roy (1977) undertook an inquiry into teaching style of classroom questioning and pupil achievement. The major objective of the study was to find out the relative effectiveness of the three styles of teaching upon pupil achievement for the instructional objectives of knowledge, comprehension, application and total achievement. The three styles of teaching were (1) lecturing (2) questioning and response without feedback and (3) questioning response - feedback sequence. The sample of the study was 98 students of Baroda High School of standard VIII. The study revealed that the three teaching styles had equal effects on the development of knowledge and application abilities and total achievement of pupils. With regard to comprehension ability, there were differential effects. Lecturing differed significantly from question - response - feedback sequence. Question - response without feedback and question response - feedback did not differ significantly.

Chakraborty (1978) undertook an inquiry into the strategies of classroom teaching. The objectives of the study were (1) to find out the effectiveness of strategy S_1 - lecturing and questioning answering ; strategy S_2 - lecturing and questioning answering by using behavioural objectives and strategy S_3 - discussion by using instructional materials,

on the development of knowledge, comprehension, applicational ability and total achievement in geography of pupils of standard IX and (2) to find out the effectiveness of strategy S_1, Strategy S_2, and Strategy S_3 on the retention of knowledge, comprehension, applicational ability and total achievement in geography of pupils of standard IX. The major findings of the study were : (1) lecturing and questioning-answering by using behavioural objectives (S_2) was found to be more effective than lecturing and questioning-answering (S_1) for knowledge, comprehension, applicationand total achievement at post test level and for knowledge, application and total achievement at retention level. (2) Lecturing and questioning-answering with behavioural objective (S_2) was found to be more effective than discussion by using instructional materials (S_3) for knowledge, comprehension, application and total achievement at post level and for application at retention level. (3) Discussion by using instructional materials (S_3) was found to be more effective than lecturing and questioning - answering (S_1) for application at post test level and for knowledge, comprehension, application and total achievement at retention level.
(4) Lecturing and questioning - answering with behavioural objectives (S_2) and discussion by using instructional material (S_3) were more effective than lecturing and questioning - answering (S_1) positively and conclusively.

2.2 Studies on Development and Use of PLM and Its Role as a Major Component in a Teaching Strategy

(a) Western Countries :

Beane (1965) undertook the study, together evidence on the relative effectiveness of Linear and Branching techniques of programmed instruction, using subject matter from high school plane geometry. The study based on specific question, Do these two basic types of programs produce significantly different results in achievement, retention or attitude toward programmed instruction when used by students on different ability levels ?

Forty-eight subjects in four experimental groups worked through a two week unit on parallel and perpendicular lines in high school geometry using programmed instruction. The relative effectiveness of the experimental treatments was judged on (a) post-test achievement scores (b) retention scores (c) attitude toward programmed instruction (d) preference for the linear or the branch program (e) time spent on material and (f) the efficiency in learning.

All four treatments resulted in a significant amount of learning during the two-week experiment; in each treatment group, the high ability students exceeded the low ability students in achievement, retention and efficiency. The branch

programme was completed in considerably less time than the linear program. Nevertheless the students expressed attitudes more favourable to the linear program than the branch program.

Bartz, and Darby (1965) compared supervised with non-supervised completion of programmed text-book and programmed instruction with formal instruction. Forty-three subjects were assigned to four groups characterized by (1) Formal instruction (2) Supervised programmed instruction (3) Non-supervised programmed instruction (4) No instruction. The results indicated that the non-supervised completion of programmed text was less efficient in terms of achievement than supervised programmed instruction or formal instruction. It was concluded that programmed texts were effective in the instruction of algebra, provided the students' study was supervised.

Spadgnoli (1965), undertook the study to expose the control and experimental groups to the same material in a concentrated effort over a limited period of time. Ninety pupils participated in the experiment. The two experimental groups used the linear programmed text entitled latitude and longitude, while each of the two control group was taught the same material by conventional means. The total length of the instructional time ranged from three to five hours divided over a two week period.

The programmed method of instruction was at least as effective and as successful in teaching the material as the conventional teaching.

In the opinion of the experimenter, programmed materials of this nature designed to cover a specific topic in a short period of time can be used effectively as enrichment or remedial materials.

Flynn (1966) investigated the influence of programmed instruction upon the learning of identified achievers and underachievers. The learning method for this study was educational psychology. Two linear programmed units written by the investigator,were utilized as experimental treatments. One unit dealt with individual differences and other with measurement and evaluation.

Four groups of students were used ; two experimental and two control groups. The experimental subjects learned the material solely by programmed instruction, meeting for three class sessions of 45 minutes in length for two consecutive weeks. The control groups learned the material in a lecture - discussion arrangement, under the direction of investigator. The results of the study were, (1) programmed methods of instruction yield significantly greater gains in learning for identified school achievers than regular classroom methods of instruction, (2) While achievers using programmed materials,

gain significantly more from pre-test to post-test, self-instructional devices do not result in greater retention, (3) underachievers perform equally as well as on achievement measures regardless of teaching method employed, (4) programmed method of instruction did not produce a greater amount of retention for underachievers than classroom methods of teaching and (5) the amount of time spent by subjects using programmed methods of instruction is significantly less than the time normally spent by studies in the regular classroom while the resultant learning and retention is similar.

Ryan (1968) intended to ascertain the relative effects in student achievement among four instructional groups, (a) teacher, (b) teacher aide involvement in a programmed instructional format, (c) independent working of programmed material and (d) no instruction (control).

The results indicate that effective student learning does take place when the teacher's role is well defined, the student's role is clear and when the instructional material is carefully organized toward specific objectives.

The results also indicate that both the teacher and the teacher aide were effective in adding something to the instructional situation which improved the programmed materials, especially as is evidence in the retention test results. However, the present investigation does strongly suggest the

added effectiveness a programmed instructional sequence can assume with the addition of teacher or teacher aide improvement.

Hughes and Reid (1975) designed the experiment to compare the effectiveness of programmed instruction and conventional classroom teaching.

The special feature of this study is that material for conventional teaching was also structured in the same manner as the material developed for programmed instruction. The authors of the study are of the opinion that organization of instructional methods and materials should be identical for comparison.

The relative effectiveness of the two methods of instruction was investigated using a post-test, an attitude scale and time taken for instruction as criteria. Half the pupils knew that a post-test would follow instruction while half did not. Half the pupils were tested the day after completing their instruction while the other half were tested eight days after.

Those pupils given the lessons had significantly higher measured achievement than the pupils who worked through the programme, and that achievement was significantly lowered when post-testing was delayed for eight days rather than for one. Knowledge that the post-test was to be given had little effect on achievement.

Those pupils taken the lessons had significantly more favourable attitudes towards the lessons than the programme pupils had towards the programme. The mean time spent working on the programme was slightly longer than the mean time spent working on the lessons.

The results of this study conflict with most of the established findings in programmed instruction / classrooms teaching comparisons. Reviews of such studies (e.g. Hartley 1972, Schramm, 1964) show that programmed instruction is usually found to be superior to classroom teaching or there are no significant differences between the methods. Only occasionally do studies report a significant difference in favour of classroom teaching. However, when these studies are examined critically it is clear that, while a good deal of time was spent developing an effective programme, little effort was made to develop an equally effective set of lessons. In addition, the post-test was usually prepared by the programme writer, introducing certain kind of bias. In the above study, every care was taken to develop an effective set of lessons.

The authors concluded that in this case good organization of material coupled with teacher participation was more effective than good organization of material without teacher participation.

Hagen (1975) undertook the study to develop and evaluate an individually-prescribed instructional programme in Geometry for tenth-grade students who were low-achievers in mathematics. There were three questions posed to assess the program. The first question asked was whether, as a result of the instructional program, low achievers attain a mastery on the criterion referenced tests written for the program. Since for 82 of the 84 objectives field tested, no more than two students required teacher instruction in addition to that provided in the self-instructional booklet and since for 70 of the 84 objectives, no students required extra instruction, it was concluded that the instruction provided by the program was satisfactory.

The second question to be answered in evaluating the program, was whether, the students showed any increase in their Geometric aptitude. The mean gain score on the Lee Test of Geometric Aptitude was significant at the .01 level.

The third question inquired as to whether the program promotes in low achievers a more positive attitude towards mathematics. When the pre-test and post-test scores on the Mathematics Inventory were compared, there was no significant difference.

Jackson (1976) compared the programmed instruction and computer-based instruction. The premise of this investigation is

that computer assisted instruction is more effective teaching tool than programmed instruction. More specifically, students trained by the computer-assisted instruction method would have a higher arithmetic mean score on the post-test and would retain more information than those students trained by the programmed instructional method. To test these hypotheses, a 2 X 2 repeated measures design was developed. A group of 60 randomly selected undergraduate students at The American University were randomly placed in two groups. Each of the 30 students in Group I was given a programmed text discussing the salient features of school bond issues. Each student was permitted to study the programmed material for a period of time not to exceed 2 hours and record the actual amount of time on the cover of the text.

The other 30 students, Group 2, were given instructions through computer. (Terminals to interface with the data base). The time required for each student to complete the instruction was recorded by the researcher. At the end of the instruction both groups were required to take identical post-tests within the hour. The results of the study clearly indicate that the effectiveness of computer-assisted instruction and programmed instruction are equal under the circumstances and condition of the present study.

(b) India :

Shah (1964) developed a programme on equation solving. The present study, was one of the first systematic attempts in the field of programmed learning in India, aimed at developing a programme on solving equation and evaluating it against the conventional lecture method. The sample consisted of three sections of class VI in an English medium school in Delhi. The findings of the study revealed that (i) the experimental group taught by programme alone achieved more in less time, (ii) as regards the ability dimension within a group, it seemed that the programme was effective in terms of gain for all the ability groups, (iii) no significant interaction between treatment and ability was found, and (iv) the group taught by the teacher with the help of programmed instruction failed to do better.

Mullick (1964) conducted an experiment on a programmed learning lesson ina a correspondence course. The objective of the study was to investigate the effectiveness of programmed learning technique in a correspondence course situation and also to study the attitude of students of the said course towards lessons prepared on programmed learning lines. The findings of the study were (i) the difference of mean scores obtained by the experimental and the control group was significant at .01 level. It implied that the programmed lesson proved better than the conventional lesson, (ii) taking forty percent as the qualifying marks in the post-test, it was observed that

only thirtythree percent students of the experimental group failed as against fortyeight percent failure in the control group, (iii) in the control group nine percent students obtained seventy five percent marks or above in the post test, whereas twentyfive percent in experimental group got over seventyfive percent marks, (iv) by and large, an overwhelming majority of students favoured the introduction of programmed learning technique.

Desai (1966) compared the programmed learning versus traditional approach in the teaching of Gujarati in standard IX. The study attempted to adopt the technique of programming in the teaching of language and also to analyse the reactions of pupils to the programmed learning approach. The sample consisted of two sections of class IX of a secondary school in Ahmedabad. A programme was developed on 'the types of compounds' laid down in the high school syllabus of Gujarat for the Gujarati language. The findings of the study revealed that (i) the difference between the two means of the experimental and control group was significant at .01 level. (ii) the programmed learning approach was more effective than the conventional teaching approach for students ranging from high IQ to low IQs; and (iii) students welcomes the new approach more than the conventional approach in teaching.

Sharma (1966) compared the programmed method of teaching algebra with the conventional classroom lecture method with a delayed post test, to study the relative retention under the two methods. The sample consisted of eighty students of class IX. The findings of the study were (i) mean achievement of the experimental group taught through the programmed method was found to be 2.5 points higher than that of the control group taught by the teacher through the lecture method, (ii) sixty percent of the experimental group secured cent percent on the test, whereas only twenty percent of the control group could reach that high standard, (iii) the experimental group had a minimum score of four, whereas the control group showed a minimum of zero; and (iv) the delayed post-test also showed better retention by the experimental group.

Sharma (1966) studied the achievement in Geography through programmed instruction. A programme was developed on the topics in geography covering the shape of the sun and the earth, earth's rotation and revolution, north and south poles, and latitudes and longitudes. The purpose of the study was to compare the programmed lesson with a lesson on the same topic taught by the teacher through the conventional method. The findings of the study revealed that (i) there was a gain of 23.10 points in the pre-test and post-test scores of the group taught by the programmed

learning method, (ii) the group taught through the conventional method improved on its pretest scores by 9.12 points only; and (iii) the difference between these two scores was significant at .01 level, showing a clear superiority of the programmed learning method.

Shah (1969) undertook the study to develop an Auto-Instructional programmes in Algebra for standard VIII and to find out their effectiveness in relation to different variables. The purposes of the study were (i) to examine the potentialities of the auto-instructional programmes as a practical solution to some of today's critical problems in education and (ii) to make the teachers conversant with the technique of preparing auto-instructional programmes. The study involved the comparison of experimental and control groups. Four schools of Ahmedabad were selected for the experiment. Two comparable classes of each school were taken for the research purpose. The results of the study were (i) that total mean score achieved by the experimental group was higher than the total mean score achieved by the control group, (ii) the average time taken by the experimental group was less than the average time allotted to the control group, (iii) the order of difference between mean achievement for the two methods changed with the achievement levels (iv) with some explanation of a few technical terms, the standard VI students could learn through the

programme easily and could answer the 'self-tests' given at the end of each unit quite satisfactorily, but taking almost double time to go through the same content learnt by the students of standard VIII.

SIE (Gujarat, 1970) studied the effectiveness of programmed instruction as revisional lessons. The objective was to study the programmed learning method in relation to different situations. Sixteen classes of eight schools were taken up for the purpose of study. The whole course of algebra of standard VIII was programmed. The findings revealed that the mean achievement of the experimental groups was higher than the mean achievement of the control group.

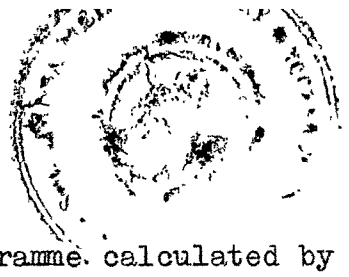
SIE (Gujarat, 1970) conducted the study to find out the effectiveness of programmed learning. The objectives of the study were ; (i) to make the teachers aware of the new method and (ii) to try out the developed programme. Two comparable groups of eight schools were selected. Programmes were developed in different subjects and were administered to the groups. t-test technique was used. The findings were : (i) programmed learning worked better than the conventional method and could save time; (ii) ninety percent students liked to work by this method; and (iii) teachers were benefited by the programmes, because they could get a picture of microanalysis of the subjects.

Mehta (1973) undertook the investigation into the effectiveness of programmed material in English for developing reading ability. The study was undertaken with the assumption that a change in the method of teaching reading in Gujarati children would lead to better acquisition of the skills in reading English on the part of the learners. Another effect of such a change in the teaching method would be in the matter of retention of the previously learnt material. The programmed reading material was prepared for the children studying in class IV in the State of Gujarat. In all, 252 pupils from six schools in the city of Baroda were included in the sample. The experimental group was given the programmed reading material whereas the control group was taught through the conventional teaching method. The results revealed that pupils in the experimental group read significantly better than their counterparts in the control group. The pupils of the experimental group retained significantly more than their counterparts in the control group.

Bhusan (1973) undertook the experimental study of a Linear programme in educational statistics for B.Ed. student teachers. The main objectives of the study were (i) to prepare a linear programme in educational statistics using Hindi as the medium of presentation; (ii) to study the workability of the programme for various levels of qualifications, age, motivation, intelligence

and for different sex; and (iii) to prepare a manual for the guidance of the consumers of the programme. The sample consisted of fortytwo B.Ed. student-teachers taken from a college of education situated in an urban setting in the jurisdiction of Meerut University. The findings related that (i) the mean of the attainment scores on post test was found to be seventyeight percent, (ii) the average performance of students at the knowledge and application levels was almost equal in amount and identical in composition, (iii) the Pearson's coefficients of correlation between time taken and intelligence scores revealed a significant and negative relationship, whereas the same between time taken and attitude scores indicated a marginal relationship, (iv) average attainment of female group was found to be higher but less variable than the male group.

Chauhan (1973) developed a programme text in educational psychology for B.Ed. level. The objectives of the study were : (i) to evolve a suitable programme in educational psychology for B.Ed. level; (ii) to provide auto-instructional material in educational psychology which may be used as supplementary materials for the course and (iii)to meet the growing challenges of providing in-service training to teachers. The sample consisted of 150 student teachers. The findings of the study were : (i) the error rate of the entire programme did not exceed 8.72



percent, (ii) the density of the programme calculated by taking into account the number of frame and number of responses expected was found to be 1.117 ; (iii) the sequence progression for each unit was fairly normal and (iv) the opinion expressed by the student teachers was found to be favourable towards the programme.

Shitole (1976) aimed at developing learning material for agricultural subjects in Marathi medium secondary schools and to study its utility for different categories of students. The specific objectives of the study were (i) to develop programmed learning material regarding a few difficult concepts from the agricultural syllabus for standard VIII of Marathi medium schools, (ii) to evaluate these programmes, (iii) to compare achievements through this programme and through the traditional method and (iv) to find out how effective one has been over the other. The study was conducted in Sholapur district and involved four secondary schools teaching agriculture. The sample consisted of 48 girls and 352 boys. Results showed the superiority of programmed learning method over the traditional one, irrespective of the category and sex of the student. The study also showed that programmed learning method required less time than the traditional one.

Bhusan and Goswami (1979) studied the effect of structural communication and linear programme of performance of high,

middle and low intelligence children at different levels of Bloom's taxonomy. The purpose of the study was to investigate the effectiveness of structural communication as compared to linear programming when measured at knowledge, comprehension and higher objectives (Application, Analysis, Synthesis and Evaluation) of Bloom's Taxonomy (cognitive do main). The study was conducted on 50, VIII grade girls of English medium school. The results of the study were (1) structural communication was found more effective than linear programmes in a segment of chemistry, (ii) the general intelligence level favourably affected average aggregate performance through two instructional strategies, (iii) structural communication appeared to nourish the higher objectives over basic objectives slightly but definitely more than linear programme.

The results of this study is not in the line with the previous studies reported earlier. It did not suggest any superiority of PLM when it was compared with structured lecture. The nature and the result of this study is in line with one study, (Hughes and Reid, 1975) reported in the section (a) of western countries, under the same caption 2.2.

Govinda (1975) undertook the study to develop the programmed text on Educational Evaluation for the B.Ed. students of M.S. University, Baroda. The study was conducted on 69 B.Ed. students

The major objectives of the study were (1) to develop a programmed text for the course 'Educational Testing and Techniques of Evaluation' as specified in B.Ed. syllabus of M.S. University of Baroda, Baroda, (2) to experimentally validate and study the effectiveness of the programmed text, (3) to develop an attitude scale and measure students' attitude towards programmed learning. The results of the study were : (1) a programmed text is as effective as structured lecture (2) eighty percent of the students had favourable attitude towards programmed learning (3) students with more favourable attitude achieved higher scores, (4) intelligence and achievement motivation had no definite effect on achievement, (5) there was no significant relationship between attitude of students towards programmed learning and their intelligence, (6) there was no significant relationship between attitude of student towards programmed learning and their academic motivation.

Afterwards Yadav and Govinda (1976) attempted as an institutional project to develop strategy for the course, wherein PLM was combined as a major component with other components like library reading, discussion and practical work. The selection of these components was mainly dependent upon the various objectives of the course to be achieved.

The results revealed that nearly 50 percent of students scored 73 per cent of marks and above on the comprehensive test which

is generally considered as performance with distinction, only less than 10 percent of students scored 40 percent marks and below, and 20 percent of them scored above 90 percent marks. A closely similar trend was observed on each unit test. To investigate whether the learning through PLM combined with other components is more effective than PLM alone, the comparison was made between students' performance on comprehensive test where learning took place through PLM alone and where other components of the strategy were allowed. It was found that the introduction of the components library work, discussion and practical work with PLM had positive influence on the achievement of students. Thus, the attempt to systematise the instructional process by using PLM as one of the components and integrating it with other components in the development of strategy proved successful.

Another study was conducted by Sansanwal (1977) in which an instructional strategy was developed for teaching a course on 'Research Methodology' to M.Ed. students and M.Sc.(Home Science) students of the M.S. University of Baroda. The component selected for the strategy were PLM, library reading, discussion, seminars, criterion test and discussion after criterion test performance. The major objectives of the study were (1) to study the effectiveness of the instructional strategy as a whole in terms of students' performance on

criterion tests and a comprehensive test, (2) to study the effectiveness of individual components of instructional strategy in terms of students' reaction to each of its components, (3) to study the relationship between achievement through the instructional strategy and the students' personal characteristics.

The strategy was found to be effective to the extent that 70 percent of the students obtained 70 percent marks on all criterion tests. The effectiveness of each component of the strategy was studied by observing the students' reaction. The majority of the students reacted favourably which proved that the different components helped them in learning. Regarding the relationship between achievement and personality characteristics, it was found that intelligence and English language ability were significantly related to the achievement, but no such relationship was found between academic motivation and achievement in his study. From such results it was concluded that integration and sequential order of different components had enriched the instructional process.

Sheshadri (1978) undertook the study to develop the instructional strategy for the course on mathematics for standard X of English medium school of Goa. The components of the strategy were (1) introduction by the teacher, (2) programmed learning material, (3) exercises or assignments

(4) tutorials (5) summary or recapitulation (6) mathematical games or group discussion (7) post test (8) discussion of performance on post test and feedback sessions.

She studied the relationship between achievement through the instructional strategy and personality characteristics such as intelligence, academic motivation and study habits. She also studied the reactions of students, parents, teachers and school authorities. The results revealed that the strategy proved effective in terms of favourable reactions. The achievement through instructional strategy was significantly related to the intelligence. Relation between achievement and academic motivation and study habit were positive but not significant. The strategy was proved feasible in real working condition of classroom situations.

Sansanwal and Joshi (1979) designed a study to compare the effectiveness of instructional strategy with traditional teaching in terms of students' achievement on criterion test. The study was carried out on B.Ed. students admitted during 1978-79 in the Department of Education, University of Indore. The semi-programmed learning material was prepared by the investigators on 'Learning' - a topic from Educational Psychology at B.Ed. level. Library references were integrated with PLM at suitable places. The criterion test was prepared for measuring the achievement of experimental and control

groups students. The result revealed that the mean achievement of students belonging to experimental group was significantly higher than the control group. The developed instructional strategy proved more effective than traditional teaching.

2.3 Studies on Achievement Through PLM and Instructional Strategy in Relation to Students' Characteristics and Attitude Towards the Approach

(a) Western Countries :

Porter (1961) conducted a study to compare the relationship between intelligence and achievement in 'spelling' for a group of children taught through programmed learning and [illegible] for a group taught through traditional method. He found that the correlation between intelligence and achievement was lower for the group taught through programmed learning than that for the group taught by traditional method.

Shay (1961) concluded that IQ did not serve as an adequate predictor of learning ability on their study.

Alter (1962) studied the relationship between intelligence and retention of material learnt through programmed instruction. He reported that students of high intelligence performed better on the retention test rather than those of low intelligence.

Tarweek (1964) using a mathematic programme found no significant difference between the mean scores of successful

and unsuccessful learners with respect to IQ.

These studies found no significant relationship between intelligence and achievement whereas the following studies found learning to be significantly related to intelligence.

Lambert, Miller and Willey (1962) in their study using a programme over 800 frames found that learning was significantly associated with intelligence.

Evans (1963),using Holland and Skinner's program,'The Analysis of Behaviour' with university students taking the introductory psychological classes found significant difference in terms of error rate and criterion test score when the students were divided into three groups on the basis of their intelligence test score. Intelligence was related positively to criterion test score and negatively to error rate, both relationships linear.

Studies by Cresswell (1964) and, Larkin and Leith (1964) have shown a significant relationship between intelligence and learning gained from programmed instruction.

Lewis and Gregson (1965) with a sample of restricted IQ range (80 - 115) did find the effect of intelligence on both immediate and retained learning to be highly significant, the higher ability levels having consistently superior results.

Over and above the intelligence, several investigators have

contributed their studies to find relationship between other personality characteristics of students and achievement through PLM.

Dick and Seguin (1963) studied whether personality pairing of learners (pairs having similar or dissimilar dominant and submissive traits) contributes differentially to performance on a programmed course. Fifty six freshmen were given the performance on English Grammar. Besides other tests of English, ability etc. 'Berareuter Personality Inventory' was used as a measure of personality. It was found that the dominant similar group showed a more favourable attitude towards the programmed course than the submissive - similar group. Considering the contribution of interaction between personality type and pairing procedure of the forty-eight possible comparisons, only two were significant.

Eigen (1963) investigated the attitude of high school students towards programmed instruction. He found that attitude vastly differed from student to student. However, he concluded that students' attitude towards programmed instruction did not bear any relationship with the amounts they learnt through the programme.

Eigen and Feldhusen (1963) studied the relationship between achievement and several student characteristics including attitude towards programmed learning. They found that the personality

characteristics and attitudes were not consistently related to the student's amounts of learning.

Doty and Doty (1964) studied the effectiveness and of programmed instruction in relation to five students characteristics, viz., academic ability, achievement motivation, creativity, social need and attitude towards the programmed instruction. The results revealed that the achievement on instruction was found to be significantly related to creativity and attitude of male students towards programmed instruction. For female students, there was a significant relationship between programmed instruction scores and attitude towards programmed learning.

Raynolds and Glazer (1964), correlated intelligence scores and criterion test scores achieved through programmed learning and other methods of teaching. They concluded that intelligence scores cannot be taken as predictive of the amount of achievement that results from linear programmed instruction.

Stolurow (1964) conducted a study on twenty gifted students who participated in a problem solving institute to investigate whether achievement through programmed learning is related to mental age. The students' learning experiences consisted of studying self-instructional programmed materials over a six-week

period. The investigator found that mental age of students did not correlate significantly with post programme achievement scores.

Stone (1965) studied the effects of student's study habits and their attitudes towards programmed instruction on the performance through programmed text and conventional text format. Two sections of a lower division educational psychology course taught were as the two treatment groups. One section was termed the control section and consisted of an incidental sample of thirty eight subjects. The second section was designated as experimental section. No significant differences were found between the two sections in terms of predicted grade point average, sex, age, study habits; efficiency and scores on a pretest of material to be covered in the experimental period. The experimental section was instructed through the use of Skinnarian type of learning programme, while the control section studied the same subject matter using a conventional textbook and lecture approach. The results of the study are summarised as : (1) programmed instruction was found to be more efficient than conventional instruction when time was considered as one measure of efficiency. (2)Study habits yielded no differential effects on performance under the two modes of instruction used in the study. (3) There was almost no significant relationship between student attitude towards concepts associated with programmed

instruction of the kind used in this study (linear) and student performance that cannot be accounted for by relationship between student ability and student attitudes. (4) there was significantly negative relationship between student attitudes and student ability (5) There was no significant change in student attitude as a result of experience with the learning programme used in the study.

Brinkmann (1966) designed a study to find the relationship between the effectiveness of programmed learning and student's attitude towards it. He concluded that students who preferred programmed instruction to teaching by teacher scored higher on the post test. Those students who felt that teachers could teach much better than the programme had consistently scored below the median on post test. Also the majority of those students who indicated preference for only occasional utilisation of programmed learning were found to have scored below to median.

In the study by Davis and Leith (1967) the experiment was set out to evaluate the effects on 'learning' and 'attitude' throughout a programmed learning task by manipulation in the controlled situation of four major determinants in learning, i.e. (i) pupils' environment (ii) social reinforcement (iii) teacher interaction (iv) personality variables. The following main conclusions were drawn :

1. No difference in the achievement and attitude of the two environment groups was found.
2. Positive social reinforcement affects favourably both achievement and attitude in programmed learning as compared to neutral and negative reinforcement.
3. No difference was found between the teacher applying social reinforcement and reinforcement being inherent within the programme.
4. The factor of extraversion showed a low negative correlation and that of anxiety gave low positive correlation with achievement and attitude.
5. A highly positive attitude in favour of programmed learning method was noted.

Filep (1967) examined the relationship of learner characteristics, viz., IQ, achievement, sex, ethnic classification, parents occupational grouping and audio-visual stimuli presented in linear and branching sequences. The experimental population consisted of 1,222 eight grade students drawn from four junior high schools. The findings were as follows :

(1) The learner characteristics did interact with media and programming modes to affect scores on the dependent variable. Total IQ scores provided the highest correlation with the dependent variable. (2) The experimental children, identified as having low IQ, non-white and representing the three lowest occupational groups obtained higher scores after

receiving the non-verbal sound, branching treatments provided in this study. (3) Some indications were obtained that children in the exceptional category prefers better on all branching treatments. (4) The results of comparisons of the linear and branching modes revealed different patterns for all three experiments (using subject content designated as non-concrete, concrete and action process). In all the three experiments the score for students completing branching treatments were higher. An analysis of covariance indicated that this was significant at 1 percent level in experiment I, 5 percent level in experiment II, and no significant difference in experiment III.

Davis and Banning (1968) conducted a study on the role of personality and attitude variables in programmed instruction. Ninety seven tenth and eleventh grade mathematics students were individually administered the 'Wechsler Adult Intelligence Scale'. Before and after the experimental procedure, a programmed mathematics course, Semantic differential scales were administered to assess attitudes about school, learning, classes, teachers, programmed instruction, programmed texts, basic mathematics course, programmed mathematics and regular mathematics. Factor analysis showed few relationship between attitudes and grades, and attitudes and personality variables. Multiple correlation analysis showed the differences between

the variables which contribute to the two different criteria such as the lack of correlation between the criteria and the over-riding effects of attitudes.

Ripple et al. (1969) administered the interaction between each of the four personality characteristics, viz., anxiety, compulsivity, creativity and exhibitionism and sex, intelligence and achievement based on combined test scores of recall, transfer and generation of hypothesis from programmed instructional and conventional instruction. Pilot studies of one year duration carried out on five thousand, eight grade students were used for reliability and validity checks. The actual experiment also of one year duration was carried out on 1100 eight grade students of 22 schools. The students were equated for intelligence and sex and were assigned, randomly either to programmed or conventional instruction in vocabulary development - word meaning and usage. Pre-tests rated students on the four personality characteristics and intelligence. Four-way analysis of variance was performed to test all possible interactions. The results indicated that no interactions of personality traits with instructional mode were significant.

Hayes (1976) studied Tape/Slide approach to individualized instruction. The study dealt with the units of instruction to develop performance skills in soldering in a basic electronic class. The purpose of this study was to measure achievement and

attitude change of students who were taught by programmed tape/slide presentations as compared to the lecture/demonstration method.

For the first unit, the control group received instruction utilizing tape/slide lessons while the experimental group received instruction in the traditional lecture/demonstration method. For the second unit, the control group received lecture/demonstration instruction and the experimental group received the tape/slide lessons.

A statistical analysis of the results of the performance scores revealed that the group using the tape/slide lessons on unit one did not perform as well as the students receiving lecture/demonstration instruction. However, the results were not statistically significant at the .05 level of confidence. The group using the tape/slide lessons on unit two performed better than the students receiving lecture/demonstration instruction. Again, the results were not statistically significant. A measurement of student attitude towards the method of instruction remains unchanged at the conclusion of the study. It is apparent by the result of this research study that performance skill can be taught effectively with tape/slide materials.

(b) India :

Kapadia (1972) designed a study to investigate the relationship between four personality variables, viz.: anxiety,

intelligence, self-sufficiency, extraversion-introversion and achievement of pupils on two types of PLM namely linear and branching. The sample consisted of 525 pupils of class VIII drawn from 11 schools in Baroda city. Relationship between the variables was studied by finding out product moment and partial correlation coefficients. The results found significant relationship between achievement on both types of programme and intelligence. But the correlation between achievement and intelligence on branching was low as compared to linear. Anxiety correlated negatively with achievement on both types of programme. No significant relationship was found between self-sufficiency and achievement on both the types of programme.

Pandya (1974) studied the effectiveness of programmed learning strategy in learning of Physics in class X of secondary schools. The objectives of the study were (i) to determine if the instruction given by programmed learning method resulted in significant gain in learning by the students. (ii) to determine if there was any relationship between intelligence, achievement motivation and amount of learning that occurred. and (iii) to determine whether or not the students liked programmed learning method. A sample of class X students of six schools in the rural areas of the four districts of Gujarat

State was selected. The major findings of the study were : (i) the experimental group achieved more in all the four tests; (ii) the gain of the students of the experimental group at the post test score was significantly greater than the pre test scores; (iii) learning through programmed learning material benefited the students with high, middle and low IQ. ; (iv) the developed programme gave enough challenge to lowly motivated pupils than to highly motivated pupils.

Patel (1975) attempted to develop programmed learning material in Geometry for standard IX and to study its effectiveness in the context of different variables. Fourteen classes of fourteen rural and urban high schools formed the sample of the study. The findings revealed that : (i) the programmed learning material proved to be more effective than conventional method, (ii) high and low IQ groups of students performed better with PLM than with conventional teaching, (iii) the average time taken by the group learning through PLM was less than that of the group taught by the traditional method; and (iv) students from different strata of the society performed better with PLM than with conventional teaching.

Kuruvilla (1977) studied the relationship between the performance of the students on post-test and reading comprehension, academic motivation, dependency and total adjustment

with four different forms of linear programme,viz., linear overt, branching,skip and response prompt form.The sample consisted of 301 students of standard VIII of English medium schools of Baroda. The results found positive and significant relationship between performance of students on post test and reading comprehension on each form separately. No significant relationship was found between performance of students on post-test and academic motivation on linear overt, branching and response prompt form. Only skip programme had a positively significant relationship.

Patel (1977) attempted to develop and tryout the auto-instructional programme in some units of Geometry for class VIII and to study its effectiveness in the context of different variables. The major objectives of the study were : (i) to develop programmed learning material in some units of Geometry for class VIII ; (ii) to compare the achievement in Mathematics of students having different reading abilities, and learning through PLM and traditional way of teaching, (iii) to compare the achievement in Mathematics of the students having different study habits, and learning through PLM and traditional way of teaching, (iv) to compare the achievement in Mathematics of students with respect to anxiety and n-Ach, when taught through PLM and traditional way of teaching. The sample consisted of 810 students of class VIII studying in fourteen schools of Kaira

District. The findings of the study were : (i) the auto-instructional material does not work well with pupils having low n-Ach. (ii) in case of highly motivated students the material was found to be working well; (iii) the PLM was found to be effective for the pupils who had good study habits as well as those who had poor study habits, when compared to traditional way of teaching, (iv) learning through auto-instructional programme in case of students having poor reading ability was not more effective than the conventional method but it was superior in case of students who had good reading ability; and (v) the more anxious students could learn better through PLM than their counterparts.

Sodhi (1977) conducted a study for the evaluation of Programmed learning in chemistry in relation to taxonomy of educational objectives, intelligence and personality traits at the higher secondary level. The programmed learning material and criterion tests were developed for the study. The sample consisted of 135 grade XI science students. The findings of the study were (i) the PLM through branching frames was superior to lecture method in terms of total achievement and categorywise achievement of four topics; (ii) the PLM of linear style was superior to lecture method in respect of overall achievement and achievement in categories of application, analysis, synthesis and evaluation but no significant difference was marked for

knowledge and comprehension categories. (iii) Branching programme was superior to linear programme in case of total achievement and achievement in application, comprehension analysis and evaluation categories. (iv) Branching programme was superior to lecture mode in total achievement and in all the six categories of cognitive educational objectives. (v) Intelligence facilitated achievement only on four topics. (vi) Many of the personality traits behaved as redundant variables but certain of them significantly correlated with achievement.

2.4 On-going Studies

Menon (1977) is trying to evolve a multi-media approach at the post-graduate level for the course on 'Educational Technology'. Other studies are going on at Bangalore and Baroda. One of them, Jayalaxmi (1977) is trying to develop self-contained and self-sufficient instructional materials for teaching a course, Educational Psychology to B.Ed. students in a teachers college at Bangalore. Bhat V.D. (1978) is studying the effect of simulation in the performance of teacher trainees in Educational Psychology. Ankleswaria (1977) has compared different instructional strategies for teaching a course on 'Nutrition' to second year B.Sc. (Home) students of M.S. University, Baroda.

Other studies on similar line are going on for developing multi-media instructional modules at the secondary school level. Two of them are Ravindranath (1977), Vardhinee (1977) aim at evolving multi-media strategy for teaching the complete course in Biology and Physics to standard VIII students in a secondary school of Baroda. Joseph (1977) is trying to develop multi-media strategy through Linear and branching and Linear and diverted programme for teaching English grammar to standard IX and X students in secondary school in Baroda. Biswal (1977) is developing a strategy for the effective utilisation of school Broadcast Programmes in Orissa State. One study is on completion at Gujarat Vidyapeeth where Shah (1979) has developed a programme in the form of an assignment for Mathematics for the students of standard V of primary school of Gujarat State.

Reviewing the researches it can be observed that efforts have been made to bring the teaching-learning process under the scientific investigation for its systematisation. But in the beginning such efforts were not enough to provide any framework for effective instructional work due to certain limitations.

The various attempts made to identify certain effective patterns or styles of teaching behaviours showed different results in different studies in connection with their effectiveness in terms of the achievement of objectives. One pattern proved more

effective for knowledge and comprehension objective, while other pattern proved more effective for application objective only. The studies undertaken to investigate the effective strategy i.e. combined approach proved superior in comparison to the use of one single method and particularly to the lecture method. By analysing the results it seems that it is very difficult to teach effectively for various objectives through one single method. And the favourable results from the studies undertaken for teaching through sequencing different methods, is enough to support it.

In the same manner from the review of studies regarding PLM, it is found that initially the programmed material was developed for individual topics, [illegible]. Such programmes could not cover the full course, so they had very limited scope for being adopted in regular instructional work. Secondly, experiments carried out for such materials were of very short duration. Such experiments were not sufficient to decide about the suitability of PLM in a real classroom situation over a long period of time.

The empirical evidences from the studies undertaken to develop the instructional strategies where PLM was combined with other components suggest to utilize it as a major component along with other components. But the results regarding the relationship between students' personality characteristics and achievement through PLM and through combined approach are

equivocal. Hence further researches need to be undertaken in this direction.

It can be also said that the use of PLM and other teaching patterns, like questioning-answering, problem-solving, proved more effective in comparison to lecture method. But, in case of two studies, Govinda (1975) and Bhusan and Goswami (1979), where comparison was made between PLM and structured lecture, Govinda found PLM as effective as structured lecture, while Bhusan and Goswami found structured lecture superior to PLM. Moreover, the results were found to be more effective when PLM was combined with other components in the strategy as a major component. Students also showed their favourable reactions to the approach.

The various results suggest that, teaching method to be proved effective, or ineffective or less effective depends upon how it is utilized. The basic consideration to utilize it effectively is the objective for which it has been selected, and its integration with other suitable methods. Therefore, the review of researches confirm that there is a need to conduct various researches to systematise the instructional process by selecting and integrating the suitable components for its enrichment.

Going through various studies in the area of Examination and Evaluation it revealed that more studies have been undertaker

to study the factors affecting the effectiveness of examination at school and college levels. The major findings revealed that the effectiveness of examination is affected mainly due to the defective question papers. These defects are : (1) inadequate coverage of content (2) no consideration for the reliability, validity, discriminating power, difficulty value of question items, and (3) inconsistency in marking. This suggests that paper setters, who are actually teachers, might possess limited knowledge about the essential qualities of good question paper. The teachers should be well trained not only for teaching but also for evaluation procedure. Proper utilisation of evaluation techniques is necessary to improve the examination system which can be considered as a part of teaching - learning process.

Few efforts have been made at the institutional level to set up a question-bank as a practical and significant step towards examination reform. More efforts in this area at different institutions could equip the institutions and teachers with the pool of reliable and valid questions. But the pre-requisite to develop the question-bank is that teachers should have the knowledge and experience about the construction of different types of questions and also about the procedure to find out reliability, validity, discriminating and difficulty value. This needs evolving effective instruction for the techniques and procedures of educational evaluation. No other study except that of Govinda(1975)

has been undertaken in this area for the effective teaching of evaluation techniques and procedures. The title of his study is, 'Development of a Programmed Text on Educational Evaluation and Experimentally Studying its Effectiveness as Instructional Material for B.Ed. Students.'

Looking to the title of this study it can be observed that the technique utilized for teaching the course was PLM only. But the course 'Educational Evaluation' contains various objectives which cannot be fulfilled through PLM alone. The PLM, of course, could be effective for one or two specific objectives but not for all. So, there may be possibilities for remaining gaps due to the limitations of the technique of providing various learning experiences needed for the effective learning of the course. The present investigator, thinking of a step forward to make the study more reliable intended to supplement PLM with other suitable components so that almost all the instructional objectives may be achieved. This means that the development of an instructional strategy for teaching Educational Evaluation to S.N.D.T. Women's University students can be undertaken to achieve different instructional goals in an integrated fashion.

This investigation is an attempt to bring instructional technology in real classroom situations where B.Ed. (S.N.D.T.)

students would be exposed to an instructional strategy for studying the course on 'Educational Evaluation'.

The next chapter presents all the details about the present study.

CHAPTER II

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