# CHAPTER III

## STUDY OF RELEVANT LITERATURE

The title of the investigation reads as "A Study of Difficulties in Teaching English and the Effectiveness of Programmed Teaching". The term programmed teaching is quite a recent one. It has its roots in the concept of educational technology and systems approach. Since both these terms have come in vogue recently, it is advisable to throw some light on concepts like educational technology and the systems approach first and then review relevant research studies.

### 1. Educational Technology

The term educational technology or instructional technology is often used in two different connotations (Lumsdaine, 1964). In the first sense the term educational technology refers to the application of physical sciences and engineering to provide mechanical or electro mechanical tools or 'hardware'. Taken in this sense the term educational technology denotes audio-visual aids like silent and sound films, motion pictures, tape recorders, etc.

In the second sense the term educational technology refers not to the hardware but to technology in the generic sense. An instructional technology comes into operation when the science of learning and communication is applied to teaching. Thus instructional technology is the application of science of learning and testing to the art of teaching and instruction. Different disciplines like psychology of learning, theories of communication, cybernetics have contributed to the growth of the technology of instruction.

The National Council for Educational Technology (Richmond, 1970 p.5) defines educational technology as the development, application and evaluation of systems, techniques and aids to improve the process of human learning. Leith defines it as "the application of scientific knowledge about learning and the conditions of learning to improve the effectiveness of teaching and ~~learning~~ training" (Richmond 1970 p.5). Kulkarni (1969 p.3) defines educational technology as a science of techniques, methods and media by which educational goals could be realised."

Taken in the second sense, the term educational technology becomes synonym with Programmed instruction; a term which has been in vogue ~~since~~ for some time. Although the term educational technology is a recnt one and has a wider connotation than programmed instruction, we would use the two terms interchangably.

## 2. Educational Technology in the West

The first application of technology to instruction can be traced back to Sidney Pressey. He designed an automated testing machine (Pressey, 1926) which also taught. The sporodic attempts made by Sidney Pressey, Little and Porter are chronicled by Lumsdaine and Glaser (1960).

The big mile stone in the development of programmed instruction and teaching machines came in the mid fifties with the work of Skinner. Skinner (1954) used his experiences of animal training to the education of human beings and started the movement of teaching machines and Programmed learning. Dececco (1964 p.10) humorously remarks that the movement of programmed instruction 'had its prophet in Pressey and the creed was formed by proselytes as Skinner and his associates'. The teaching machines, developed by Skinner and his associates, were based on the principles of reinforcement and gradual progression.

In developed countries like the U.S.A. programmed material either in the book format (Software) or in the form of mechanical and electronic devices (hardware) was increasingly used in industries and armed forces in the sixties. Kulkarni (1970 p.75) reports that 42 per cent companies used 34 per cent of total programmes on a home study or correspondence basis. Most of the companies (77%) used programmed (62%) during working hours.

The armed forces of the U.S.A. have developed a number of programmes on training problems. The Southern Signal Corps at Fort Gorden, Augusta, Georgia prepared programmed material for their courses. The Human Factor Division, Chief Office of the R & D, U.S.Army, studied integration of programmed learning with closed circuit television. Other institutes like The Keesler Air Force Base, the Air Force Academy at Denver, the Medical Service School and Air Force Systems Command at Bedford have also been keenly interested in programmed instuction and researches pertaining to that field (Kulkarni,1970 p.77).

In the United Kingdom, upto the end of December 1967, 1667 programmes were available (Basu, Cavanagh and Jones,1969 p.60). Out of the total British programmes 71% of the programmes were of hardware type, TV instruction, closed circuit TV and computer assisted instruction is now becoming common in most of the developed counties.

3. Educational Technology in India

The movement of programmed instruction and educational technology started in India in early sixties. Now it has developed firm roots in Indian education and training.

The first workshop on programmed learning was organised by the National Council of Educational Research and Training (NCERT) in 1965. Since then the NCERT has, till June 1973, organised eight sequential courses on programmed learning , and

has trained about 300 persons, drawn from various fields like education, defence, industry and health, in the skill and technique of programme development.

In 1966-67 a voluntary body named Indian Association of Programmed Learning (IAPL) was formed. The main objectives of this association ~~are~~ were to disseminate the idea of programmed learning to take up research and publication work, and to help in the development of auto instructional material. The IAPL has till December, 1972 held four national level conferences. The association also publishes a newsletter the 'IAPL Newsletter'.

Besides the NCERT and the IAPL other institutions like the Centre of Advanced Study in Education Baroda, National Institute of Bank Management, Bombay, Technical Teachers Training Institute, Madras, Central Institute of Indian Languages, Mysore, the Regional College of Education, Ajmer, Vidya Bhawan Teachers College, Udaipur and the State Institute of Education, Rajasthan, Udaipur are some of the institutions which are actively engaged in the production of programmed material.

4. Characteristics of Programmed Learning

The most important aspect of hardware educational technology, as that of software technology, is its programming content. Markle (1967 p.104) defines programmed instruction as "a reproducible sequence of instructional events designed to produce measurable and consistent effect on the behaviour of

each and every acceptable student". This definition is more comprehensive than those given by Encyclopedia Britanica (Vol. 18 p.563) and by Laysaught and Williams (1963 p.16).

Stolurow (1969) gives four basic features of programmed instruction.

1. It focuses a learner's attention on a limited amount of material.
2. It requires a response to each segment of material. Hence it demands active participation of the learner.
3. It gives immediate feedback to the learner.
4. It allows the learner to proceed at his own pace.

Lumsdaine (1968) and Lange (1970) contend that the effectiveness of programmed instruction is mainly due to the following features of programmed material.

1. It stresses conditions of learning to the teaching process. It provides a systematic rationale for ordering students' responsive environment. Thus, it has a behavioural sciene approach.
2. It affords replicability. It provides a continuous objective record of students' performance and offers criteria for determining gains in performance. This research image of programmed learning promises to provide a feedback for curricular development and cost accounting in instruction.
3. It has a self teaching quality.
4. Its emphasis on task analysis, mapping of enroute behaviours, and specifications of final performance help us to re-examine many content items of school and college curriculum.
5. It has empirical process of developing reproducible teaching-learning material. Unlike a textbook writer,

a programmer doesn't sequence on a priori intellectual analysis. Sequencing of programmed material is based on empirical data.

6. It has a quality of accountability. It is accountable that it is it is supposed to accomplish what it purports to accomplish and that something is measurable.

7. It is individually paced. It doesn't lock up a student to a fixed rate of presentation.

8. It demands active participation from students. Students are expected to respond, overtly or covertly, to each segment of programmed material.

9. It provides feedback to the student.

5. Programming Styles

In the context of this study a detailed account of the programming styles is not warranted. however a brief introduction to the styles would not be out of context.

There are four styles of programming, viz the linear, the branhing, the branear and the mathetic style. These styles differ in format as well as in the underlying theoretical principles.

(i) The Linear Style

Skinner's style is called the linear style. It has the following characteristics.

(a) The subject matter is divided into small steps called 'frames'. The frames run in a linear fashion The small steps lead the learner progressively towards the terminal repertoire of behaviour.

(b) The size of the step is such that it doesn't allow students to commit errors. It provides success experiences to the learner.

(c) It demands overt responding from the learner. The learner according to Skinner (1964 p 108 ) must construct a response. A response shouldn't merely be selected.

ii) The Branching Style

The branching style was propounded by Crowder. In a branching type programme, a student is exposed to a short discussion of the material to be learnt. This is followed by multiple choice questions designed to test the teaching point discussed. Each answer alternative has a page number. If the student chooses correctly, he goes to the next learning item, if he chooses a wrong alternative, he has to go through a discussion about the why of his incorrectness. he is then asked to return to the original question, choose the correct response and go to the next frame.

Crowder (1964) holds that errors have their own role in learning. Unlike Skinner, he doesn't advocate for an error-less learning programme. Crowder also holds that responses should be selected rather than be constructed. On this point, Crowder again shows his disagreement with the linear style.

Branching programmes in contrast to linear ones are multiple track programmes where the student instead of constructing the response is required to select a response.

(3) The branear style ~~programmes~~

The branear programmes combine qualities both of the linear and the branching styles. These programmes can be considered as a hybrid.

(4) The Methatic Style

The mathetic style of Gilbert (1962 a, 1962 b) is quite a technical and a complicated style. It employs specific teaching strategies for specific learning tasks. The three different teaching strategies (depending upon the learning tasks involved) are chaining, multiple discrimination and generalisation.

The unit in mathetics is called an 'exercise'. The size of an exercise is not decided spatially. It depends upon how big step a student can reasonably take. An exercise is a behaviour unit designed to establish a single operant. Unlike a frame, an exercise is not a physical unit. It is a behaviour unit, i.e. it is designed to produce a unit of behaviour change.

A mathetic programme differs from other styles in two ways. First the reinforcement is given directly through the students' performance and not through confirmation (correct answer) techniques. Second, the skeleton of a typical mathetic programme follows a particular sequence viz demonstrate - prompt - release sequence.

Writing a mathetics programme demands a thorough prescription of repertoires and rigorous development of well

designed exercises. The first step in prescribing repertoires is to prescribe the mastery repertoire or terminal behaviours. Instead of analysing the task into content items, the programmer must prescribe the mastery repertoire in terms of behaviour complexes. Gilbert considers three behaviour structures as basic structures. They are chaining, multiple discrimination and generalisation.

Having analysed the mastery repertoire the mathetician should then assess initial repertoire. Since it is a very difficult to develop programmes tailored for each student, the programmer should insert differential prescriptions in the programme itself. Differential prescriptions (abbreviated as D-$P_x$) takes care of those students who do not have required initial repertoire. Each set of Differential Exercises (D-Ex) is preceded by a diagnostic test. Those who fail on it are diverted to D-Ex.

Writing of exercises includes giving the student theory as well as practice on that teaching item. Gilbert holds that it is better to supply theory to the student right in the beginning. This helps the student to retain better and foster generalisations. Before writing actual exercises, the programmer should always prepare competitive and interaction analysis tables i.e. what stimuli will interfere and what will facilitate the learning of a particular response. One of the main strategies

used by a mathetic writer is that of the backward chaining.

Using mathetic notations an exercise has an observing stimulus ($S^O$), instructing stimulus ($S^I$), and prompting stimulus ($S^P$). $S^O$ and $S^i$ are given in the demonstration exercises whereas $S^P$ refers to those components of an exercise that get the student to observe the operant to be mastered. $S^O$ has two functions; one to ask the student to attend to the operant ($S^D$) and two, to identify the critical properties of the operant ($S^C$). Limitation of space compels the investigator not to go into the details of exercise writing.

6. Programming Procedure

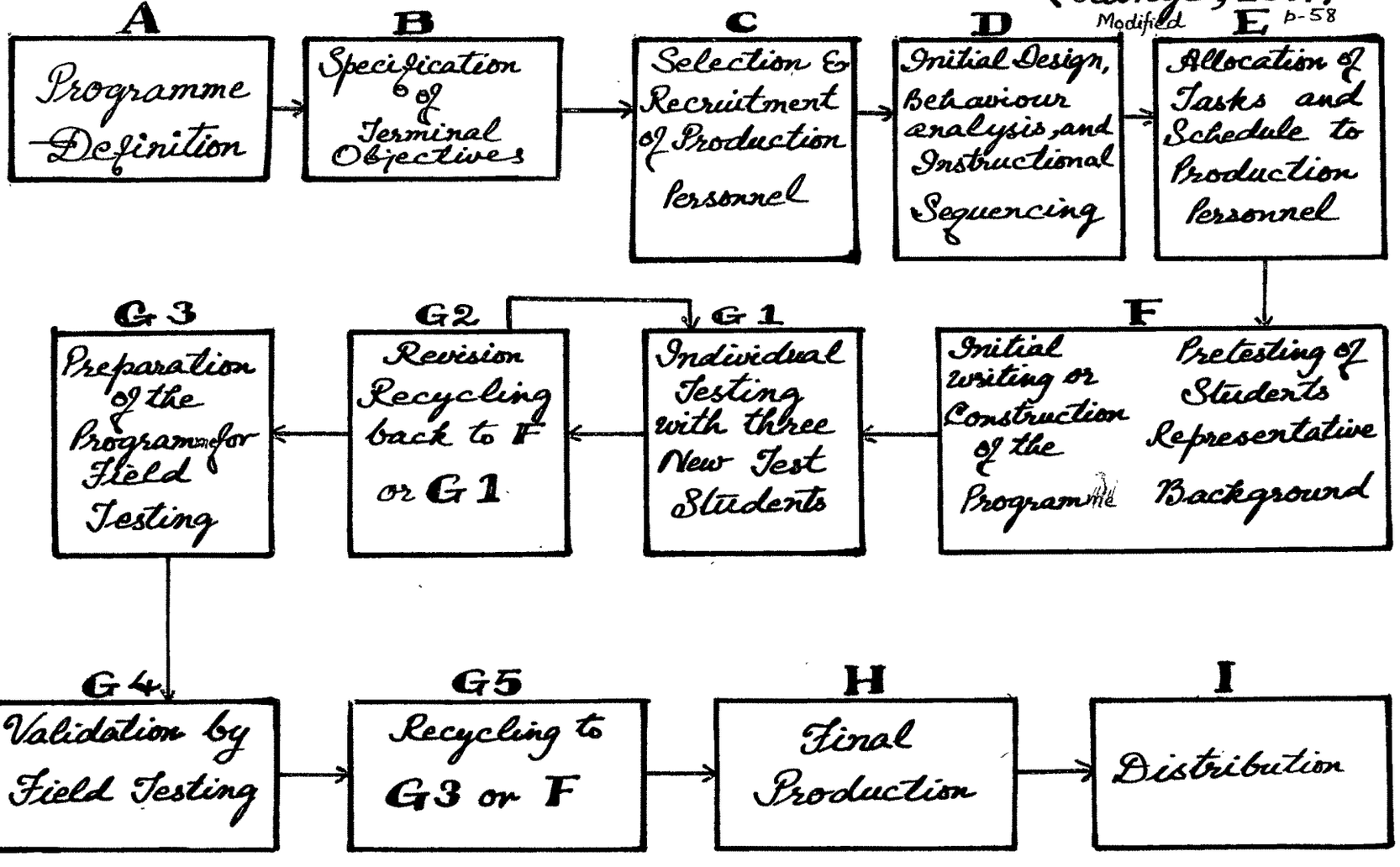
Writing a programme is a system in itself. Further, it is a cooperative task. For writing a good programme, the services of a programmer, a subject matter expert, a frame editor, format and art designer and a language expert are essential.

Although there are no pre-established rules of procedure the following sequence of steps is generally taken by programmers. The programming procedure (after Lange 1967) is flow charted in Fig. 5.

1. Selecting the topic.
2. Specifications of terminal behaviour and entry behaviours and construction of the terminal and entry tests.
3. Recruitment of production personnel.

# STAGES OF THE PROGRAMME PRODUCTION PROCSS

(Lange, 1967) Modified p-58




FLOW CHART 5

4. Task analysis and preparation of the flow chart.

5. Allocation of tasks.

6. Writing the first draft, and editing by content and frame experts.

6a Revision of the first draft.

7. Individual try out.

7a Revision.

8. Field testing.

8a Revision.

9. Validation and final Production.

7. Teaching of English and Educational Technology

(1) Impact of Linguistics

Important innovations in recent years have taken place in the methodology of teaching English. The first advance between 1945 and 50 have been towards practical teaching of language ability. The second advance since 1955 has been towards application of linguistics towards language teaching (Halliday et al 1964 p.185).

Christopherson (1967 p.107) observes that two important innovations viz pattern drill and comparative structural analysis have taken place in language teaching. Structural linguists have found out some points that give great difficulty to a learner. Structural linguists, by making a contrastive analysis, determine points where there is a marked difference between the mother tongue and the target language. Thus it is possible to predict some of the pupils' difficulties and to take remedial measures.

Some of the contibutions of linguistics to language teaching can be summarised below (Carroll,1966; Halliday,et.al, 1964; Lado, 1964, Stevens, 1964; Mackey,1969; Wolfe,1967; Finocchiaro, 1964).

1. Speech is the primary aspect of a language.

2. Language is dynamic. It is not static. It keeps on changing through time and space.

3. Language can be described at various levels viz phonological, morphological, syntactic and semantic.

4. Language material can be graded. A graded (staged and sequenced) material is useful for practical teaching purposes.

5. Constrative features of the native and the target language can be spelled out at phonemic lexical, syntactic and semantic levels.

6. Linguistic behaviour occurs most effectively in the context of situations.

7. Pattern practice helps in mastering various sentence patterns.

8. Language is a system of systems. One can deal with only a sub-system at a time. Wolfe (1967,p.184) advises us to limit attention on a limited linguistic unit. Stevens (1964 p.67) advises to teach and learn a language by "quanta". Mackey (1969 p.161) holds that it is impossible to teah or learn the whole language.

Linguists like Lado (1964), Halliday (1964), Finochiaro (1964), Brooks (1964) have spelled out certain principles which effectively help in language acquisition. The main principles, germane to English teaching are summarised below.

1. Teach speech before writing.
2. Teach the sound system of English first.
3. Teach basic sentence patterns and structures.
4. While teaching sentence patterns, keep the vocabulary load at the minimum.
5. Teach vocabulary items only in the context of real situations.
6. Introduce and practice new sentence patterns with vocabulary already known to the student.
7. Shape a response, not in the repertoire of the student, by providing him prompts and cues.
8. Let the student know immediately about the correctness of his response.
9. Introduce very little material in one lesson.
10. Let each learner experience the target language being used in meaningful ways, either in spoken or in written form.
11. Let each learner have the opportunity to try out his target linguistic skills.
12. Teach in such a manner that each student gets success experience.

Since 1950's a new theory of grammatical analysis, transformational generative grammar (Chomsky, 1957, 1965) has influenced language teaching. It operates with Kernel sentences from which other sentences can be generated by transformational rules.

(2) Impact of Hardware

Language teaching has also been influenced by the use of hardwares. Different teaching aids like gramophones, tape recorders, films, linguaphones, are becoming regular teaching

aids. Radio and Television are also used for broadcasting educational programmes. In Rajasthan, lessons in English are broadcast from Jaipur. Many schools and correspondence courses students make use of these radio lessons.

Television and Language Laboratories are more sophisticated forms of teaching aids. In Delhi Television is being used for educational programmes. Bombay and Calcutta would soon follow the suit. Language laboratories at the National Council of Education Research and Training, New Delhi, Central Institute of Indian Languages, Mysore, Central Institute of English and Foreign Languages Hyderabad, are being used for language teaching.

(3) Teaching of English through Programmed Material

Programmed Learning material has also been used for teaching languages. In Manhasset and Denver (Edling,1964) hundreds of students were taught English through programmed material. Lado (1964), Carroll (1963), Markle (1965) hold that programmed material helps students improve their linguistic skills. Tickoo (1971) holds that looking to Indian conditions, programmed material can be a very effective tool in remedial instuction.

8. Programmes in English

English Language Services Inc. Washington has developed books and workbooks on English language. There are about 30 tapes with each book and Workbook. This package, called English 900, is designed to cover both ~~syste~~- spoken and written aspects

of the language.

CENCO Programmed Learner is yet another package containing six programmes; two on spelling, two on structures and two on vocabulary.

English 2600 and English 3200 (Blumenthal,1962) is another course in English usage and grammar. These programmes are in linear format and cover all aspects of grammar and usage.

Markle (1962) developed a programmed course on vocabulary development. Fergus (1964) developed a programme on spelling improvement Sullivan (1963,1964) developed two programmes; one on syntax and other on grammar. Hughes (1965) developed a programme on "The Full Stop". West (1964) developed a programme on "Commas". Other programmes developed are on reading (Buchanan, 1966) and vocabulary (Markle,1962) and Syntax (Roberts,1964).

In India, the number of programmes developed is very few. Two programmes are available in the printed form. One programme prepared by Bhattacharya is on the use of prepositions. This programme is published by the Regional College of Education, Bhubuneshwar. Another programme on 'Degrees of Comparison'is published by the Educational Tehnology Cooperatives, Madras. The year of publication is not given on both the Programmes.

Some programmes, at some institutions are under preparation. The Central Institute of English and Foreign Languages, Hyderabad is preparing a full package of programmed and non-programmed material for beginners. The investigator under the University

Grants Commission Project has developed four programmes on 'Tenses'. The investigator, under the same project has also prepared a film strip on "contractions". Other programmes under preparation by the investigator are on 'The Behaviour of S' and on 'An introduction to morphology: A programmed text.

9. Programmed Learning and Teaching of Languages:Research Studies

Rocklyn and Moren (1960) developed a programmed course for teaching a limited knowledge of spoken Russian to Infantry soldiers. Vocabulary and grammar were confined to the minimum. All work was done by self instruction using tape recorder and a form for recording responses. The method involved learning paired English and Russian sentence patterns. Post test established that a satisfactory degree of competence was attained by all students.

An ambitious pilot project was carried on at the Harvard University in 1960 (Morton,1960) using a tape recorder, the course sought to give 80 per cent fluency in Spanish at the end of a semester's time. The couurse was an intensive one, covering a total of 249 to 415 hours in and outside classroom work. No work on reading and writing was included. Fifteen out of twenty students finished this course successfully and achieved high grades.

Carroll's self-instructional programme (1963) gave satisfactory results. Carroll's programme comprised three operational modes viz the familiarisation mode, the learning mode and the testing mode.

Sweet (1966) developed a programme of 10,000 frames divided into 30 units. He taught all students of IX grade of a school in the U.S.A. Results on the post test are not available.

Marty (1962) developed a programme on teaching of French at a College in the U.S.A. The results were quite encouraging. Morty realised the following limitations of auto-instructional material.

1. The students missed the teacher student relationship.
2. Reinforcement provided by the machine is not enough. A machine doesn't take that variety of forms that it takes when it comes from the teacher.

Carpenter and Green (1963) presented a course in English by programmed material, teaching machines and film strips. No significant difference in learning outcomes was noted when all the modes of presentation were compared with conventional classroom teaching. It was however seen that programmed treatment produced higher scores and lower variance on the unit tests.

Grell (1963) compared effectiveness and efficiency of programmed learning method and conventional textbook method in teaching spelling to fourth grade children. It was found that programmed method was more efective in teaching spelling when tested on delayed recall.

Plotkin (1963) compared the effectiveness of programmed learning material with the textbook in teaching spelling to fourth grade children. It was found that programmed learning method had no superiority over textbooks but it offered economy

of practice time.

McNeil (1964) conducted a study on programmed learning versus usual classroom procedures in teaching boys to read. The study revealed that many of the problems which arise as a result of teacher behaviour do not operate in auto-instructional procedures.

Stolurow (1963) found that retarded children perform better when taught through programmed material as compared to those who were taught through conventional teaching. The linguistic skills covered were vocabulary and comprehension.

Edgerton and Olshansky (1962) taught spelling with the help of teaching machines. At the end of the year it was found that the machine group had gained significantly more in the grade equivalent scores than had the control group.

Edling (1964) reported a case study of teaching English through a programmed text. Students (one section of grade 7 and two of 8) in Manhasset were taught with the help of English 2600. The other sections continued to be taught by methods which had been customary before. It was found ~~th~~ at the end of six months that the experimental group made significant higher gains

Another study reported by Edling (1964) was conducted in Denver. Approximately 400 students formed the control and the experimental group. The experimental group was taught English with the help of a programmed text. It was found that the experimental group performed significantly better than the control group.

10. The Systems Concept

The term 'systems' is very general. Stated simply, it means anything we consider is a dynamic whole constituted of more than one elements which interact with one another and are interdependent. An analogy from human physiology point out that the human organism has many systems like the circulatory system, the respiratory system, etc. Each system comprises of many components which have specific functions to perform. These parts interact with each other and are interdependent. Further, these parts contribute to the over all goals of the system. Another example can be that of the postal system. The postal system has a particular goal. The goal is attained by functioning of different components of the postal system.

One can understand a system if one understands its goals, its components parts, their (parts') specific functions and the nature of interaction among different parts. The systems approach has the specific aims of understanding the total phenomenon and improving its performance.

(1) Definitions

A system is a set of integrated elements designed to attain the stated objectives. It is a dynamic whole whose elements have specific functions. The parts of a system are called elements, or components or entities. The different elements of a system are interdependent and interact with one another. The elements operate in such a way that they together achieve the

pre-determined objectives.

Silvern (1968,p.1) defines a system as "the structure or organisation of an orderly whole clearly showing relationship of the parts to each other and to the whole itself. Corrigan (1964 p.36) defines a system as "an organised plan carried out in detail to achieve a pre-established goal or objective". Flagle (1960,p.58) defines it as, "an integrated assembly of interacting elements, designed to carry out cooperatively a predetermined function".

(2) Chief Characteristics of a System

The above definitions point out that a system has the following four characteristics.

(a) A system has a goal to attain. The goal is specific and is measurable.

(b) A system comprises of various elements or components.

(c) The elements or the components have specific functions to perform.

(d) The different elements of the system synthesis and cooperatively function to attain the over all goal of the system.

(3) Properties of a System

(1) A system often has a supra or meta system and a sub-system. If classroom instruction is considered as a system, then the school becomes the supra or the meta system.

(2) The goals of a system must be compatible with the goals of the supra system.

(3) A system may have sub-systems. If classroom teaching is a system, then giving home assignment or class assignments or class discussion become subsystems. Objectives of the subsystem conjointly make up the objective of the system.

(4) A system is open if it has input and output. A system is closed if the output of the system is fedback to the system to regulate it and improve its performance. That is, a system is closed if it has a feedback loop.

(5) A system has wholeness if a change in any entity of the system affects changes in all other entities and affects a change in system action.

(6) A system is acceptable if it satisfies four criteria of performance, cost time and utility (Banghart,1969,p.42).

11. The Systems Approach

The term systems approach defies rigorous definition (Banghart,1969,p.21). The term is inclusive and denotes all activities from the original analysis of the problem through the final implementation of recommendations.

Bratten (1969,p.161) holds that the systems ppproach has its roots in three modern developments viz. management systems, systems development and systems analysis. Bertalanffy's theory (1951) of general systems influenced industry and business and contributed to the growth of management systems. The work of

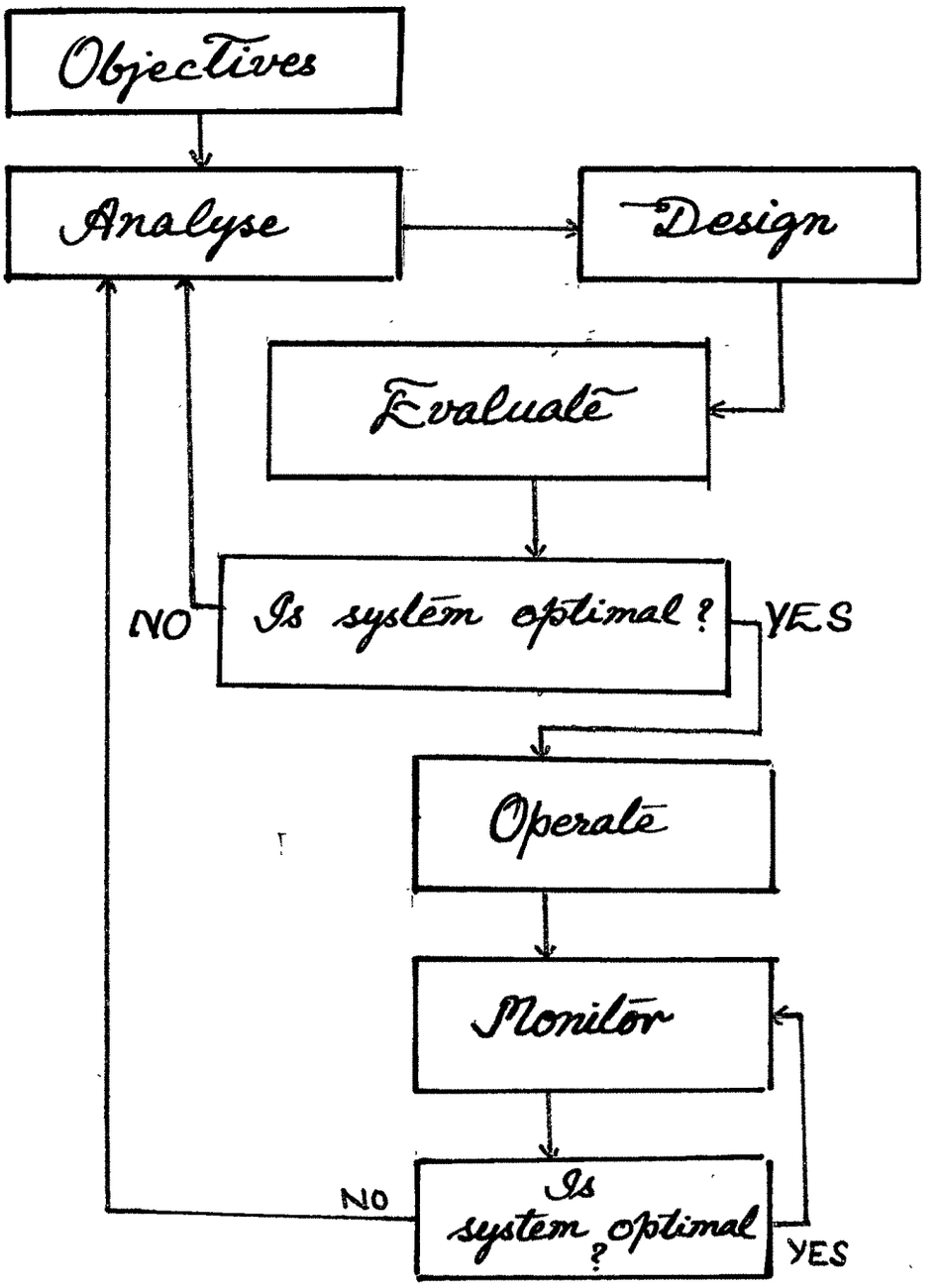
Wiener (1956) and Shannon and Weaver (1949) contributed to the systems development. The systems analysis specially flowered during World War II. Some of the weapon systems of World War II were so novel that their operation couldn't be planned by traditional military techniques. The men-machines systems required new methods of analysis. This gave rise to systems analysis and operation analysis. The Systems analysis helped in obtaining data for large and complex problems and in defining the most feasible, suitable and acceptable solution for accomplishing a given purpose.

12. Systems Procedure

There is no cookbook recipe that furnishes the systems analyst with a step-by-step outline to perform systems work. However the following steps may work as satisfactory guidelines for a system designer. Banghart (1969) gives three steps which constitute systems procedure. They are (1) system analysis, (2) system design and (3) systems evaluation. These steps are flow charted, in fig. 6.

# BASIC STEPS IN SYSTEMS DEVELOPMENT

(Banghart, 1969)
p.38




FLOW CHART 6

The first phase in the systems approach is to analyse the system. The system is analysed in terms of its effectiveness. Systems analysis includes specification of objectives, comprehensive review of all the systems operation, identification of the problem area, collection of data and analysis of data.

After the systems analysis, the analyst attempts to design a tentative solution to the problem. This stage in systems procedure has been called as Systems Design.

The third stage is that of systems evaluation. At this stage the tentative solution is subjected to testing. Following the test, necessary modifications are made in the system. The modified system is further tested. If the systemist sees that the system is not attaining predetermined goals, he stops going further and reanalyses the system. If the systemist sees that the system is attaining its pre-determined objectives, he operates the system and further monitors its performance. If the performance is acceptable the system is maintained, otherwise the system is re-analysed again.

Evaluation of a systems includes four general criteria viz performance, cost, utility and time (Banghart 1969,P.42).

The first criterion to evaluate a system is to determine how effective the system would be. It is necessary that effectiveness be defined in operational terms. When once effectiveness is defined in operational terms, the standards for measuring effectiveness should be developed. Generally

objectives are spelled out at the system analysis stage. When clear cut statements of objectives are made, it is then seen how far the new system can attain the stated objectives.

The second criterion in evaluating a system is to judge it from the cost point of view. Cost analysis can be thought of in terms of rupee investment or in terms of cost-utility.

Cost analysis enables the decision makers for making a choice among alternatives. If two alternatives are proposed to educational authorities, they like to select one which involves less rupee investment.

In field situations, the decision to select an alternative becomes difficult because cost factor of a system is to be seen in terms of its return value i.e. effectiveness. Decision makers may select an alternative which involves more in terms of rupee investment but ensures more and better returns.

The third criterion to evaluate a system is utility. In education, as in business, one shouldn't solely think in terms of rupee return on investment. Other criteria of utility in the form of spin off advantages must also be taken note of in evaluating a system.

Time is another variable which should be considered while evaluating a system. A system which saves time should be preferred to one that consumes more time.

13. Systems Approach to Classroom Instruction

If education is viewed as a system, then instruction becomes the most important sub-system. For those whose primary concern is the teaching learning process, classroom instruction itself is a system. In such a condition, education becomes the supra or the meta system.

The systems approach to instruction involves four steps.

(1) The first step is to define the objectives. This means specifying the desired output of the system in measurable terms. This is, probably one of the most difficult tasks. In many instances one fails to identify specific learning outcomes in measurable terms. This difficulty is further augmented when educationists fail to agree on the desirability of the stated 'outcomes'.

(2) The second step is to identify components of the system. An instructional system has three components, viz the learner, media and the material. The medium of teaching can be a teacher or any other sophisticated electronic device. The former has been called as the live teacher and the latter as the mediated teacher.

(3) The third step is to specify the functions of the components of a system. The essential characteristics of a system is that it is composed of interacting parts. It is the interaction that adds great richness to the behaviour of the system. A complete description of a system's behaviour requires a knowledge of the interrelationships among components as well as behaviour of each component.

(4) The fourth step is to put the elements (instructional components) into operation and evaluate their performance. If the system meets the required standards, the system is maintained. If the system fails to meet the standards, it is re-analysed and the whole cycle is repeated again.

Flow chart 7 schematically represents a system of language teaching. This model has been followed in this study.

The first step was to specify systems objectives and find out students' initial and terminal behaviours.

The second step was to identify the components of instruction. There are three components viz the students, the teacher and the teaching-learning material. New material was also developed.

The third step was to allocate functions to different components. In this study different functions were allocated to different components. (Flow Chart 9 depicts different functions of different components)

The fourth step was to put the compnents into operation and then to evaluate the performance of the system.

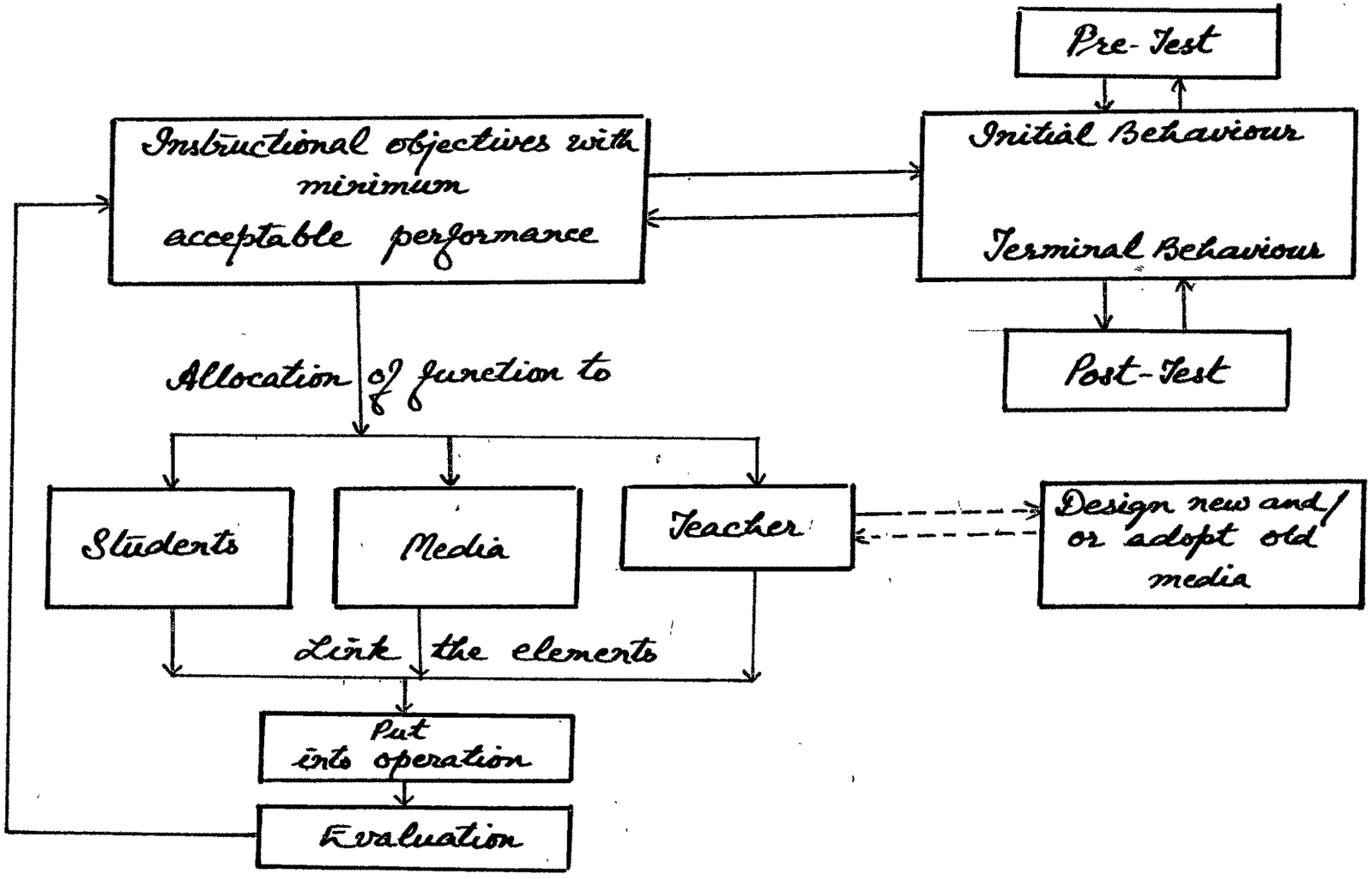
14. Application of Systems Approach

Little work in the direction of systems approach to actual classroom instruction is available. However Corrigan (1964), Silvern (1960), Kaufman (1971), Kulkarni (1969) see a great promise in using systems approach to instruction.

A practical application of systems approach is seen in Newmark and Sweighart (1966). They developed three different systems for teaching Spanish to sixth grade children. Every skill

# A SCHEMATIC SYSTEM OF LANGUAGE TEACHING

( Basu, Dewal & Misra, 1970)




FLOW CHART 7

and vocabulary item was specifically spelled out. At the conclusion of the study students were tested in each course on the pre-determined objectives. Thus it was possible to find out how successful each system was.

Meals (1967) used systems approach in planning a language course. He evaluated two systems viz teaching through language laboratory and conventional teaching on (a) achievement of students (b) required amount of training to the teacher and (c) amount of maintenance cost for the equipment.

Cogswell (1966) developed a system in terms of instructional activities. One function was to 'assign' work to students, the second function was to 'work on lesson' material, the third was to give 'help' to students who were experiencing difficulties and the fourth was to 'assess' students' progress on the lesson. He developed the system to ensure that students learn and attain mastery without wasting their time. Thus in Cogswell's model those students who completed 'work on the lessons' immediately went to take 'help' functions. Some went to 'assessment' function directly from 'work on the lesson' phase. A student cycled and recycled till he emerged successful.

In India, the systems approach is yet to enter the educational arena. However the investigator is hopeful that the arguments of some Indian thinkers (Kulkarni 1971) would prevail and more and more interest would be shown by the researchers and educational thinkers in modelling classroom teaching on systems

lines.

15. Programmed Teaching

Studies cited in this chapter are related to the concept of programmed teaching (the concept is explained in chapter IV) to the extent that they form a base line for the germination of Programmed Teaching idea.

The concept of programmed teaching found a rudimentary ~~eee~~ echo in Kulkarni and Dewal (1969) when an attempt was made to apply some of the potentialities of programmed learning to conventional teaching and lesson planning. The idea was further strengthened by Shah (1971).

In 1970 at the Regional College of Education, Mysore the investigator actually demostrated how 'group responding' and 'group confirmation' could be integrated to conventional teaching. The demonstration was observed by more than sixty teachers and teacher educators.

Another impetus to the idea of programmed teaching came from the writings of Ellson (1971) and Mitra (1971). The investigator genuinely agrees to Ellson's point of view that it is easier to shape the responses of teachers than to shape responses of students. It is easier to programme a teacher than to develop a programmed materials.

Another impetus to the idea of programmed teaching came from the studies of Hatch (1962) and Goldbeck (1962). In both

the studies it was found that students achieve higher if programmed instruction is wedded to conventional teaching.

All the aforesaid trends shaped the investigator's mind to design programmed teaching as an instructional strategy.

The concept of programmed teaching as developed in this study is on systems thinking.

To improve students performance, teachers press into service different media. The new media like programmed material teaching machines, even TVs will not be particularly effective so long as they remain the fifth wheel of instructional chariot. The new media need to be integrated into a total system. The critical question is to fit together different media. Programmed teaching is an attempt in this direction.

Further programmed teaching is based on systems analysis. But unlike a study based solely on systems analysis, it doesn't have sophisticated mathematical models to stand upon. It utilises more the spirit of the systems approach than the letter. The design of programmed teaching package is based on the analysis of classroom needs.

The next chapter discusses the main difficulties or obstacles of the learning environment, and proposes an alternative which has the potentiality to overcome some of the obstacles.