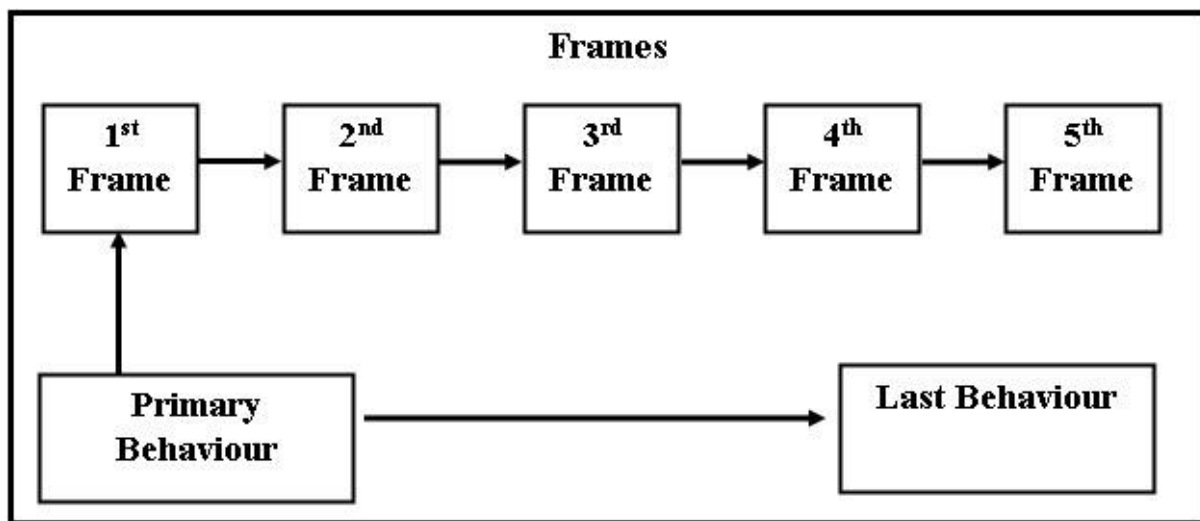


## **LINEAR AND BRANCH PROGRAMMING IN PROGRAMMED LEARNING**

The credit of linear programming style goes to B. F. Skinner. Linear programming style is related to “operant conditioning”. Operant conditioning states that human behavior is shaped through suitable reinforcement to the responses. It tells that “A Certain direction can be given to human behavior”, for this purpose activities is needed to divide in small parts and make their analysis. It is a gradual process and the responses are conditioned in a step by step manner.



In a linear programme, learner’s responses are controlled externally by the programmer sitting at a distant place. A linear programme is called a straight line programme as the learner starts from his initial behaviour to the terminal behaviour following a straight line. The student proceeds from one frame to the next until he completes the programme.

linear programme immediately reinforces student responses that approach the learning goal. Responses that do not lead toward the goal go unreinforced. Each bit of learning is presented in a “frame,” and a student who has made a correct response proceeds to the next frame. All students work through the same sequence, and a low rate of error is necessary to ensure continued positive reinforcement of correct responses.

## **Fundamental Principles of Linear Programming**

Linear programming is based on five fundamental principles-

1. Principles of small step.
2. Principle of Active responding.
3. Principle of immediate confirmation.
4. Principle of self-pacing.
5. Principle of student testing.

In this type of sequencing all students read and respond to the same frames. The sequence is linear in that there is a single line or path for all students to follow.

### **Characteristics of linear programme**

1. Linear are exposed to small amount of information and proceed from one frame to one item of information, to the next in an orderly fashion.
2. Linear responds overtly that their correct responses can be rewarded and their incorrect responses can be corrected.
3. Linear are informed immediately about whether or not their response is correct (feedback).
4. Linear proceed at their own pace (self-pacing).

### **Others characteristic of Linear programme**

- 1) Linear means proceeding in a straight line. In linear programme generally, information is broken into small steps of 40-50 words in length which is called a frame. The learner must respond to each frame in succession by filling in word or phrase in a blank.
- 2) Linear Arrangement: In such type of programme, the learner advances in a single series of short steps which are designed to ensure high rate of correct responding to the questions (frames). Same path is followed by each learner. The

learner starts from initial behaviour to the terminal behaviour following straight-line sequence. All learners pass through the same path.

3) Responses are controlled. In a linear programme, responses are controlled by the programmer. The responses and their order are fixed. The learner has no choice to respond in his own way.

4) Response is emphasized. In linear programme, the emphasis is laid on response. The learner must respond to each and every in order the learning to occur.

5) Feedback is quick. As soon as the learner responds to the frame he can immediately compare his response with the response of the programme. Learners are informed immediately about whether or not their response is correct

6) Provision for prompt. In the beginning, prompt or cue can be supplied to facilitate learning too occur.

7) Cheating is discouraged by not revealing the answer to the learner.

8) Learners proceed at their own pace. Learner can skip certain frames.

9) Responses are self-constructed. Learners respond overtly so that their correct responses can be rewarded and their incorrect responses can be corrected

### **Advantage of Linear Programming**

- The assumption behind the linear programming is students learn better if content is presented in small units, student's response if immediately confirmed, results in better learning, Student's error create hindrance in learning, Student learns better in Laissez faire environment.
- Frame size in small steps; include only one element of topic at a time. Each step is complete in itself. It can be taught independently and can be measured independently. Frame structure is based on stimulus-Response-

reinforcement. There are four types of frames. Introductory frames, Teaching frame, practice frames and testing frames.

- Responses in linear programming are structured responses and these are controlled by programmer and not by learners. Immediate confirmation of correct responses provide reinforcement, wrong responses are ignored.
  
- It is used for secondary level students, used for achieving lower objectives of learning especially for recall and recognition, useful for student of average and below average intelligence can be used in Distance education program.

### **Limitations of Linear programming-**

- 1) **Lack of motivation:** It is alleged that learning becomes dull and learner experiences monotony and boredom. It takes too much time to teach a few points.
- 2) **Freedom of choice is curtailed:** The learner has no choice of his own to respond, thus it is alleged that creative imagination of learner is inhibited.
- 3) **Costly:** It has been found that preparation of programmed material requires too much paper and time.
- 4) **Blanks and key terms are guessed:** Rothkopf is of the opinion that in many programmes, the learners find out the cues as to what is to be filled in blanks and key terms are guessed
- 5) **It can be used in limited areas:** Where the behaviour is measurable and observable such as Maths and science.
- 6) **Searching of material is not permitted:** as in a textbook. Judgmental learning is not practiced.
- c) **Does not permit differentiation among responses:** No freedom for student to response.
- 7) **Students follow a rigid line prescribed by the programmers:** Every learner has to follow the same path; therefore, student may cheat from one another.
- 8) **It is very difficult to find out exactly the background of each learner :** Programmes are generally designed with a view that learner has no previous background of the subject matter..

9) **In book form presentation:** learners are expected to be honest but from all learners we cannot expect honesty. They can see the correct response without reading the frames.

10. **Based on learning theories which were formulated by experience conducted on animals.** A human being is more intelligent, than animals, he has got an intelligent brain.

11. **Wrong responses are avoided in the program:** No remedy is provided for them.

### **Branching Programming**

The founder of Branching programming is Norman A Crowder, hence it is also known as Crowderian Model. It is based on configuration theory of learning. It is a problem solving approach. It is stimulus centered approach of learning. As the word “branching” means the subdivision the stem or trunk. The same concept is applied in the branched programming instruction style.

The main concept (the trunk of the tree) is sub divided into smaller concepts (the stems of the tree) and further again to other minute details of the topic. Norman A Crowder has given its definition as –It is a programme which adapts to the needs of the students without the medium of extrinsic device as a computer. It is called intrinsic because the learner within himself makes the decision, to adapt the Learning to his/her needs. The rationale of intrinsic programming postulates that the basic learning takes place during the student’s exposure to the new material on each page. In branching programme, the learning material is divided into “units‘ of material called “frames‘. Much information, one or two paragraphs or even a page, is provided in a frame. Thus each frame is quite larger than that employed in linear programme. The learner goes through the frame. After that he is required to respond to multiple choice questions associate with the learning material of the frame.

The learner moves forward if he answers correctly but is diverted (branched) to one or more remedial frames if he does not. These frames explain the matter afresh, ask him questions to elicit the right answer and reveal his previous

mistakes, and then return him to original frame. This cycle goes on till the learner passes through the whole instructional material at his own pace.



**Each Content frame includes the following:**

- a) Repeating student response
- b) Positive confirmation
- c) New information
- d) Question
- e) Alternatives followed by page numbers, where the student should go next.

**Each Remedial frame includes the following :**

- a) Repeating student response
- b) Negative confirmation
- c) Reasons why he is wrong
- d) Further explanation in simple language
- e) Directions as to where the student should go next.

**Features of Branching programme**

- 1) Material in a frame is larger; much information is presented at each step. A step may consist of two or more paragraphs and sometimes a full page.

- 2) The method of student response is different than that of linear model; student has to make choice out of several choices. Multiple-choice question are asked. Each response to the question is keyed to different pages. If the learner selects correct response, his response is confirmed and in case he selects wrong response, then he routed to material which explains as to why he is wrong.
- 3) Crowder holds that teaching is communication and so he concentrates his attention upon the improvement of communication.
- 4) Learner has freedom to choose his own path of action according to the background of subject matter. The learner controls the exact sequence that he will follow.
- 5) The programmer has ample opportunity to exploit the literary style.
- 6) Student is more alert and concentrates on the subject matter more carefully.
- 7) Detection and concentration of errors is important. Crowder holds that making error is basic to learning. He permits 20 percent errors in his model. In such a model first the errors are detected and then corrected. The learner knows why he is wrong. Crowder says that it is impractical to eliminate errors in the process of learning
- 8) The crucial and identifying feature of branching model is the fact that the material presented to each student is continuously and directly controlled by the learner's performance in answering questions.
- 9) Intrinsic programmed material when presented in a book form, the book is called scrambled book because the pages do not follow in a normal sequence.
- 10) It is very useful to concept learning or where the material is given in larger steps.
- 11) The role of active response is not central in intrinsic theory. Intrinsic programme offer less guidance to learner as to what material in the frame is important.

The best known branching technique is called intrinsic programming. Its major characteristics are:

- Frame size is large.
- There may be a Para or page in the frame.
- It consists of rather long frames which often appear as pages in an ordinary textbook.
- The student reads the page (or frame) and then responds by selecting the correct alternative in a three-alternative multiple-choice item.
- Each alternative is associated with a page number which directs the students to another frame.
- Frame structure is Exposition.

### **Fundamental Principles of Branching Programming**

1. Principle of Exposition,
2. Principle of Diagnosis,
3. Principle of remediation.

### **The advantages of branched programming instructions are as follows –**

1. In this format the student proceeds to the next frame until he makes an error. The errors branch him to supplementary material designed to give him remedial instruction
2. The center of the teaching – learning process is the learner and not the facilitator or the instructor.
3. The learner learns with his or her own speed and pace.
4. Much of the learning takes place when freedom is give to the learners. In branched programming style freedom is given to the learners so that they can learn at their own pace.
5. Learning is done when the new concepts are revised. The learner gets an opportunity to travel to and fro in the newly learnt content. If the



responses given by the learner are not up to the mark, the learner can start learning the content from which he or she has not understood. The correct responses are appreciated there by internally motivating the learner to grasp the content till the end.

### **Limitations of Branching programming**

- 1) The learner may guess the correct response without understanding the subject matter of the frame.
- 2) Infinite branching cannot be provided. It cannot cater to the needs of the individuals. It is very difficult to find out the total number of branches for each individual.
- 3) Cost of preparation is high, audio-visual equipment is costly.
- 4) The programme needs revision after every two years which is a very costly affair.
- 5) Programmes are the product of programmer's imagination and it is he who decides diagnostic questions and level of content.
- 6) Branching model can be used after sixth grade the grade because small children do not follow its mechanism.
- 7) It is very difficult to ask questions on the whole matter of the frames because the frames are too large and sometimes important subject matter is left.
- 8) It does not consider learning process whether learning is taking place or not. Main emphasis is on diagnosing the weakness of learners and providing remedy to them.
- 9) There is no sequencing of pages. Student finds it difficult to follow the steps. He does not find it exciting or motivating, therefore he does not want to go through these pages.

10) More emphasis on remediation rather than teaching. Hence, it is only a tutorial approach.