Programmed Instruction: To use the principles you will be learning in this unit, you might want to make a hard copy of this unit. Then you can look up the answer for a question quite easy. The answers appear at the end of this document. First write out your answer to the question and then check it with the key. Keep the next answer covered so that you will fill in the blank before looking to see if your answer is correct.

AN INTRODUCTION TO THE TECHNOLOGY OF EDUCATION AS IT APPLIES TO YOU

A vending machine, which regularly fails to make proper change, has this sign: "In this course we will be using the methods of programmed instruction quite extensively; therefore, it would be useful to learn a few things about the technology of an instant teaching machine. Just insert a quarter and you'll learn a lesson."

The purpose of this unit is to teach a few non-technical points about what has been referred to by some as the major contribution to education in the twentieth century. A more technical explanation of programmed instruction is more easily given as one learns some of the basic learning principles.

With this brief introduction, let us proceed to the mechanics involved in accomplishing this first unit on programmed instruction. This unit consists of a number of statements, or technically speaking, frames. In programmed instruction material, you read each frame carefully and circle or write your response in the space provided. The information to be taught in the program is contained in the current frame you are working on, or in the previous frames.

A technical term used for aids to remembering is a mnemonic device, e.g., in music there is EGBDF (Every Good Boy Does Fine). Here is a mnemonic device you might find useful for remembering the principles of programmed instruction:

LEARN IT BEST

Little Steps
Evaluation of Program Errors
Active Responses
Required Practice of Responses Being Learned
Negative Reinforcement and Minimized Punishment
Immediate Feedback
Teaching Technique - Not Testing Technique
Behavior Must be Specified
Environment Restricted to Insure Learning
Success Before Progressing
Terminal Behaviors Necessary

1. In our everyday language we could say that learning can, and should be fun. In learning material for the first time, one often makes many errors. As a general rule in our everyday language, we can say that most people _________ enjoy making mistakes.

2. Many have held that making errors is necessary in order to learn. The name that is given to this type of learning is trial and _____ learning.

3. If the material to be learned is programmed adequately, there is good evidence that errors are not necessary for learning. The material you are now using has been____.
Programmed instruction can be viewed as teaching by a tutorial method in which there is an exchange between the learner and the programmed material. In this programmed material, fewer errors should be made.

4. One of the characteristics of programmed learning is that the most efficient way of learning responses is to progress with little steps. If the steps are little and programmed adequately, the learner ________ likely to make mistakes.

5. You have just learned the first characteristic of programmed instruction. This characteristic states that an individual learns best when learning by __________ steps.

In programmed instruction these small steps are called frames.

6. Many of the features of programmed instruction resulted from early experiments with lower organisms. Animal experimenters learned long ago that the best way for an animal to learn a complex behavior is by using small steps followed by a favorable consequence. This procedure is referred to as shaping. Shaping is used in programmed instruction by progressing in little, or small ______.

7. The small steps in programmed instruction are technically called ______________.

Evaluation of each item becomes a key to making better-programmed items. Each frame of a good program is examined to see if the frames are doing the job. This item testing, or error evaluation, is the means by which we determine whether or not the program is working properly. Error evaluation is the second characteristic of programmed instruction covered in this course.

8. Good programmed instruction is the result of the instructor's study of frequently missed steps. These steps may be unclear, too big, require revision, or may not be adequately reviewed. The notion of testing items is an important factor in developing good programmed ______________.

9. When one observes the occurrence of many of the same errors on the same frame in programmed material, this could be an indication of a deficiency:
   A. only in the student
   B. in the program

10. Much of our present educational system is based on the notion that the student listens (perhaps) while the teacher lectures. In this traditional education framework little active responding occurs. People learn by doing; that is, making active responses. Another principle of programmed instruction is that people learn best when making active __________.

11. When the student turns off (stops attending), the teacher turns off (programmed instruction stops). This differs from much of the traditional instructional method in which the stimuli are present (lecture), but ______ responses are not made.

12. When students are working through regular programmed material, they can start and stop making responses as they like. Students stop making ______ to the stimuli when they wish.

13. An important characteristic in learning is that students actually make ________ responses.

14. The three characteristics of programmed instruction learned thus far are:
   A. Little_____
   B. _____of errors
   C. Active_____

The R in the mnemonic device LEARN IT BEST refers to required practice in programmed instruction. A statement made about programmed instruction is that it is slow and boring.
Programmed instruction is more than a quick review of a topic. By the use of various learning principles (including required practice with feedback) students are systematically taken through a learning process. At the end of the programmed unit, the active participants should have learned the material. The student will then not just have read about something that they will shortly after forget.

15. R in programmed instruction refers to ________ practice.

N in our mnemonic device refers to negative reinforcers or aversive techniques frequently used in education. One may learn to work for a favorable consequence, traditionally called reward. These rewards (or more technically, positive reinforcers) may be such things as social approval, someone saying you are right, or any stimulus which indicates your answer is correct. These reinforcers may have biological importance, e.g., meals, M&M’s, heat.

On the other hand, many behaviors are learned in order to get away from or prevent aversive events. For example, in a classroom, students may learn something to prevent scolding from the teacher, public scorn, or comments if they miss an item in class. In programmed instruction an attempt is made to minimize learning by aversive means (escape or avoidance) or negative reinforcement.

16. Programmed instruction attempts to minimize __________ reinforcement.

17. The notion of immediate feedback is also used in programmed instruction. Students receive immediate feedback if their answer is correct or incorrect. A characteristic of programmed instruction is immediate ________.

18. Acquisition of a behavior is facilitated most if there is ________________.
   A. Immediate feedback
   B. Systematic use of large steps
   C. Delayed feedback of 5 minutes
   D. Periodic feedback - every second right response

19. Acquisition of a behavior is facilitated most if there is ________________.
   A. Passive responding
   B. Negative reinforcement
   C. Immediate feedback

20. Three characteristics of programmed instruction you have now learned are:
   A. Easy small progressions or ____ progression.
   B. Actual doing or ______.
   C. Have to do it or it is ____.

21. The I in the mnemonic device stands for ______________ feedback.

The T in the mnemonic device refers to the fact that programmed instruction is a teaching technique, not a testing technique. Programmed instruction is an attempt to apply the best learning principles to the acquisition of a specific behavior.

22. Programmed learning is designed as ________________________.
   A. A communistic invention to destroy teachers
   B. A testing device
   C. A teaching device
   D. All of the above

23. In experimental work feedback, reinforcing or rewarding a sought-after behavior is very important. Giving approval or saying “you’re right” after a desired response is usually one-way of ____________ a person.
24. Whether you have or have not made the right response is known immediately. This is accomplished by presenting the correct answer immediately after your response. This gives you immediate knowledge about your ________.

25. The I in the mnemonic device stands for ______________ feedback.

26. Which of the following is the least important principle illustrated by programmed instruction?
   A. The learner is actively responding at each step of the material learned.
   B. The learner has the opportunity to put the newly learned material to immediate practical use.
   C. The learner finds out with a minimal delay whether or not his/her response is correct.

27. Programmed instruction illustrates which of the following principles of learning?
   A. Learning by doing, or active responding.
   B. Learning with immediate knowledge of results.
   C. Learning proceeding from wholes to parts.

28. One of the reasons programmed instruction works as well as it does is because it gives immediate feedback. __________
   A. True
   B. False

In programming material, problems soon become apparent if you are not going to pinpoint or specify each small segment involved in the larger topic that you are to teach. Some people contend that certain materials cannot be taught with programmed instruction, e.g., creativity. Generally what happens when you ask a person to specify what they mean by creativity you draw a blank. The person usually is unable to specify the behavior. If a subject matter can be defined, it can be programmed. Regarding creativity, one may contend that the creative person responds differently from most other people to a given subject matter. One could certainly program this. This probably is not all that most people mean by creativity. Whatever criterion is used, as soon as it is specifically defined or pinpointed, it can be programmed.

29. Complete the mnemonic device.
   L ____________________
   E ____________________
   A ____________________
   R ____________________
   N ____________________ (see the first page of this unit)
   I ____________________
   T ____________________

Frames in a program are small and they are evaluated in terms of error frequency. Usually if 5% or more miss an item, that item is eliminated or improved. This is in contrast to traditional means where an errorless item is eliminated because it is nondiscriminatory. This self-correcting feature of programming is a characteristic not found in textbook writing. A program writer pinpoints deficient frames while a textbook writer may never learn of poor material. By eliminating disruptive factors in the frames and making a more favorable environment, learning is more likely to occur.

30. Programmed instruction is based on the notion that students learn best if they learn in an environment with many distractions __________.
   A. True
   B. False
Often, as a student is studying, more difficult material may be gone over quickly. The student has learned that most likely the difficult material will not be on the test. If by chance it is, it is only an insignificant part. What happens if you require student mastery of each step in the program before progressing?

Traditionally, students continue to learn parts of what is required. Eventually this partial learning leaves the individual with behavioral deficits that are hard to pinpoint precisely. A system of success before progressing allows one to locate and correct a behavioral deficit more readily. When we say that students learn at their own pace, we are referring to this characteristic of programmed instruction.

31. In the usual programmed instruction, material is presented so the student learns at his or her own ________.

32. This characteristic has also been referred to as self-pacing. This means the student can work at his or her ________ speed.

33. The S in the mnemonic device refers to ________ before progression.

34. In programmed instruction, the individual works in small steps in a sequential arrangement. Complete the mnemonic device:
   L ______________
   E ______________
   A ______________
   R ______________
   N ______________ (see page 1 of this unit for answer)
   I ______________
   T ______________

35. What is wrong with saying “Practice makes perfect?”
   A. Only the writer is “perfect.”
   B. Practice makes perfect only if feedback or knowledge of results follows a behavior.
   C. If you practice only the mistakes, you will have a hard time becoming perfect.

36. Now let us put some characteristics of programmed instruction in different words and expressions and see if you have a concept as well as a specific response. Subject matter must be fit into a series of steps which are ____ in size and systematically or sequentially ____.

37. Here is a review item. The reason why active participation is important is because in all situations it provides feedback. ______
   A. True (participation always means feedback is provided)
   B. False (just because one is actively participating does not mean he/she necessarily will get feedback)

To insure success in early frames of the program, the correct answer may be hinted at or prompted. Later these prompts can be faded and trial-and-success will still prevail.

38. Learning with programmed material involves ____________________________.
   A. Participation by the learner
   B. Making responses which may have a hint or prompt in the earlier in the program
   C. Small steps
   D. Immediate reinforcement

39. The best results can be obtained from programming when__________________________.
   A. The learner provides his or her own responses
   B. There are errors in learning
   C. Candy is used
   D. Extensive prompting or cuing is used even in the last frame of the program.
40. The last of the characteristics of programmed instruction to be discussed in this particular program is terminal behavior. Somewhat related to specifying behaviors is the fact that one has to set up what terminal behaviors they are trying to develop in the program. A problem may be defined as the difference between the existing behavioral level and the behavior one has set as an objective. In this sense a program is aimed at eliminating the behavioral deficit. T stands for _____.

(Historical Point – The Teaching Machine)

41. Programmed instruction was used in a device called a teaching machine. The teaching machine presents the material automatically. Students wrote their responses to a stimulus and then pushed a button or lever. This makes the answer inaccessible but visible. At the same time the correct answer appeared. The mechanization of programmed learning is referred to as a _____________.

A story is told about teaching machines and a psychologist who had just returned from a trip to Harvard in 1956. A local colleague of the psychologist asked, “What is Skinner working on these days?” The reply was. “Skinner’s interests these days are in teaching machines.” The colleague shaking his head replied, “Well, what do you know! First of all Skinner taught rats and then he taught pigeons. Then came children and after that psychotic patients. Now he is teaching machines!”

It has been characteristic of science that advancement is made when measurement devices are developed. Witness the advances after the microscope, telescope, etc. Programmed instruction provides a measuring device for studying the complex behavior of human learning. As is these other areas, education has already seen some advances using programming. (Some of them will be described in later units.)

42. Historically, ________ has followed technological discovery.

In 1924 Dr. Sidney Pressey developed a device that would score a multiple-choice test automatically when the answer-button was pushed. Pressey viewed this as a testing device. Not much happened to this notion until 1958. In 1958 Dr. B. F. Skinner published a number of articles on programmed instruction.

43. Chiefly responsible for the increased utilization of programmed learning since 1958 is _____________.

Answers to learn it best:

1 do not
2 error
3 programmed
4 is not
5 little
6 steps
7 frames
8 instruction
9 B
10 responses
11 active
12 responses
13 active
14 A. steps
   B. evaluation
   C. responses
15 required
16 negative
17 feedback
18 A
19 C
20 A. Little
   B. Active responses
   C. Required
21 immediate
22 C
23 reinforcing
24 response
25 immediate
26 A
27 B
28 A
29 See text p. 1
30 B
31 Rate of speed
32 own
33 success
34 see text p. 1
35 B
36 small, arranged
37 B. false
38 A, B, C, D
39 A
40 Terminal Behavior
41 Teaching Machine
42 advancement
43 B.F. Skinner