Programmed Learning the Precursor to Computer Based Instruction

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Introduction

Following an web based search using various names for Programmed Instruction the following websites were selective as representative of the collection of sources available. For those who have the time, the excerpts tell a complete story on Programmed Learning/Instruction. For those only having a short amount of time key sections of the excerpts have been highlighted in dark red. Followed by a brief narrative summarizing key points. The full text of these sources can be found by using the url and an internet browser. The following narrative summarizes my insights and views on Programmed Learning.

Narrative

Programmed learning (PL) was intended to free teachers from having to use repetitive drills associated with spelling, arithmetic and reading.The principal at the center of PL is operant conditioning where correct actions are followed by reinforcement to reward the learner. Students progress through the instruction at their own pace after demonstrating an acceptable level of proficiency often set at 90% of students achieving 90% of the objectives.

Under PL a student progresses using self-administered instruction presented in a logical sequence with multiple content repetitions followed by testing. When the desired proficiency is attained and the specific instructional objectives achieved the learner has successfully completed the program of instruction.

PL became rapidly popular in the late 1950s and early 1960s. Interest in PL peak in the late 1960s and declined in popularity into the 1980s. With the arrival of low cost personal computers and the expansion of the internet web based delivery of PL has had a resurgence. From it's earliest development PL was not meant to replace the teacher. It was meant to provided teachers with a tool that would free them to guide students to success in higher order knowledge.

What role should PL play in the delivery of novice driver education? The most comprehensive answer to the preceding question comes from the Novice Teen Driver Education and Training Administrative Standards http://www.anstse.info/Resources%20PDF's/2019%20Resources/001%20-%202017%20NTDETAS%20FINAL%203-14-19.pdf
A portion of the referenced document has been included in a separate document submitted for legislative consideration. Also under separate cover is an analysis of MCAR 7411 that identifies problems of conflict between HF 205 and it's companion SF 235.

When MCAR 7411 and the Novice Teen Driver Education standards for online driver education are considered in light of best practices for Programmed Learning it is clear that the online managed Programmed Learning contemplated by the two bills should only be used as a instructor guided supplement to the traditional delivery of classroom novice driver education.

Sources
https://psychology.jrank.org/pages/505/Programmed-Learning.html

Programmed Learning
Originally introduced in the mid-1950s by behaviorist B.F. Skinner, programmed instruction is a system whereby the learner uses specially prepared books or equipment to learn without a teacher.

It was intended to free teachers from burdensome drills and repetitive problem-solving inherent in teaching basic academic subjects like spelling, arithmetic, and reading.

Skinner based his ideas on the principle of **operant conditioning**, which theorized that learning takes place when a reinforcing stimulus is presented to reward a correct response.

If the answer was correct, the machine would advance to another problem. Incorrect answers would not advance. Skinner believed such learning could, in fact, be superior to traditional teacher-based instruction because children were rewarded immediately and individually for correct answers rather than waiting for a teacher to correct written answers or respond verbally.

Programmed instruction quickly became popular and spawned much educational research and commercial enterprise in the production of programmed instructional materials. It is considered the antecedent of modern computer-assisted learning.

Students who have mastered the material can move ahead more quickly, while those who need more practice are repeatedly exposed to the problems.

Programmed learning also allows teachers more time to concentrate on more complex tasks.

One criticism of programmed learning centers on the lack of student-teacher interaction. It has been shown that some students thrive more fully with the human **motivation** inherent in more traditional learning situations.

https://elearningindustry.com/programmed-instruction-educational-model

Programmed Instruction was developed by B. F. Skinner. Even though he used this model in experimental settings throughout the 1920s and 1930s, it wasn't until the 1950s when him and J. G. Holland began implementing programmed instruction at Harvard. As an educational technique, it is characterized by self-paced, self-administered instruction, which is presented in a logical sequence and with multiple content repetitions.

Skinner argues that learning can be accomplished if the content is divided into small, incremental steps, and if learners get immediate feedback, reinforcement and reward.

As a method, it can be applied through "**teaching machines**", and with computer-assisted-instruction.

The Skinner's Programmed Instruction Educational Model Principles
- Learners should be active
- Instructors are asking questions to confirm learners' comprehension. The extent of understanding is reflected by the answers.
- On the spot feedback
- Instructors are providing immediate feedback to learners. As soon as they know if the response was right or wrong, they proceed to the next question or they retest what was not understood.
- Gradual steps
- Learners should be examined on small chunks of information, something that will prevent them from failing a question. Learners should feel they are making progress, something that will encourage them.
- Self-pacing
- Each learner has his or her own pace. Instructors should respect this diversity and allow them to decide on the desirable speed of learning.
- Learner verification
  The purpose of this model is to examine about whether learning was established, not if the program was good based on a specialist's POV. Learners should be allowed to evaluate the instructional program under development and instructors should modify accordingly.

https://lidtfoundations.pressbooks.com/chapter/programmed-instruction/

Programmed instruction (PI) was devised to make the teaching-learning process more humane by making it more effective and customized to individual differences. B.F. Skinner's original prescription, although it met

with some success, had serious limitations. Later innovators improved upon the original notion by incorporating more human interaction, social reinforcers and other forms of feedback, larger and more flexible chunks of instruction, and more attention to learner appeal. Although PI itself has receded from the spotlight, technologies derived from PI, such as programmed tutoring, Direct Instruction, and Personalized System of Instruction have compiled an impressive track record of success when compared to so-called conventional instruction. They paved the way for computer-based instruction and distance learning.

Operant conditioning, the major operationalization of this theory, involves the relationships among stimuli, the responses, and the consequences that follow a response (Burton, Moore & Magliaro, 2004, p. 10). The leading proponent of radical behaviorism, B.F. Skinner, demonstrated that by manipulating these three variables experimenters could elicit quite complex new behaviors from laboratory animals (Ferster & Skinner, 1957).

Large-scale school implementation projects were conducted in the early 1960s in Denver and Long Island, NY. The major lesson learned in these experiments was that although the materials themselves were effective, PI could not make a substantial impact on the efficiency or effectiveness of schooling without extensive restructuring of classroom routines and school organization.

Authors and publishers unleashed a flood of programmed materials both in linear and branching formats. Between the early 1960s and 1966, new titles proliferated at an accelerating rate as publishers vied with each other for market dominance. Figure 4 illustrates this boom, showing the growth curve of programmed materials in the United Kingdom, which was paralleled in the U.S. As with other technological innovations, the upward slope did not continue indefinitely. After 1966 the publication of new titles declined rather rapidly and then leveled off.
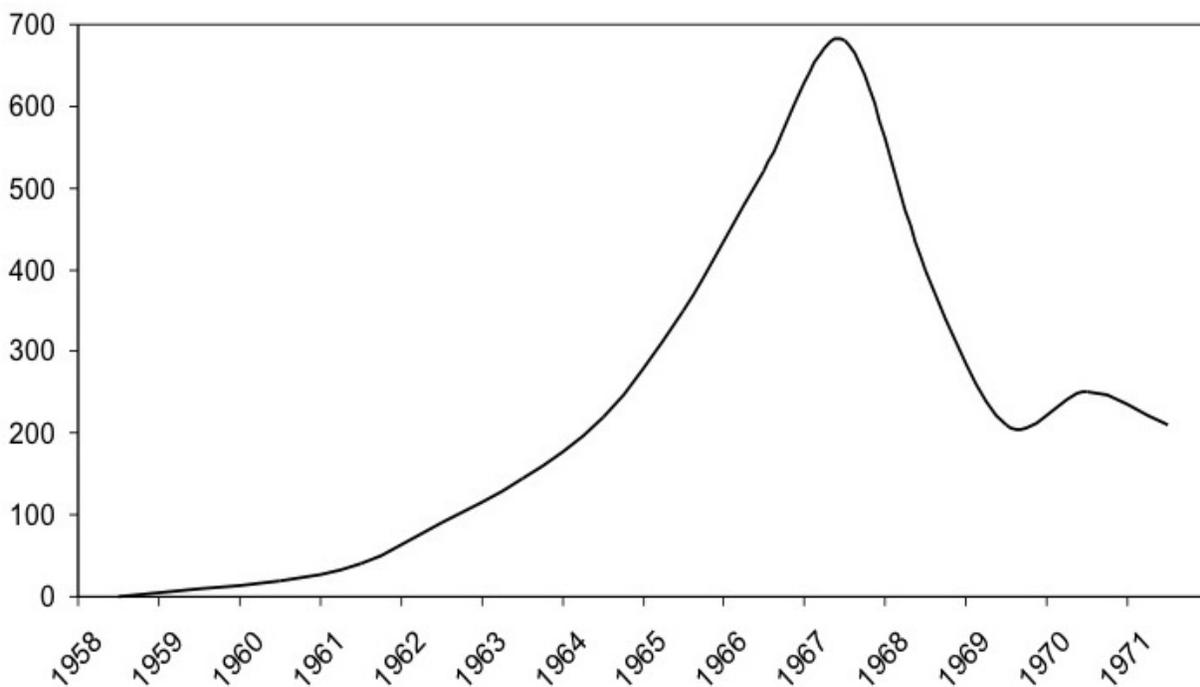
Figure 4. Number of programmed instruction titles available in the market each year in the United Kingdom. Adapted from Figure 1 in Hamer, J.W., Howe, A. & Romiszowski, A.J. (1972). Used with permission of SEDA, successor to APLET.

The US Air Force required that "at least 90% of the target population will achieve 90% of the objectives" (Harris, p. 142). This was known as the 90/90 criterion and was widely accepted as the standard benchmark of effectiveness.

In retrospect, we can surmise that PI did have several advantages over so-called conventional instruction. First, in many educational experiments, the experimental treatment simply received more time and effort in its preparation and delivery. Second, users are often attracted to the novelty of any new treatment—at least until the novelty wears off. Finally, the PI treatments not only had more time and attention, they were designed through a rigorously thought-out, systematic process, which included not only precise specification of objectives but also testing, revision, and re-testing. Indeed, it was the realization that the *design process* was the valuable part of programmed instruction that led to the emergence of systematic instructional design as a powerful tool (Markle, 1967).