MURPHY, MAE GREGORY. Evaluation of By-passing as a Technique for Adjusting a Self-instructional Clothing Program to Initial Individual Differences. (1967) Directed by: Dr. Hildegarde Johnson
pp. 107

The purposes of this study were to initiate a by-pass system into the self-instructional clothing program developed as a part of the U. S. Office of Education Cooperative Research Project No. 5-1042 and to appraise the gated program using a field test as a source of data.

Preparation of the gated program included: (1) the division of the 772 program frames into small sections of frames which could be by-passed, (2) the designation of criterion frames in the sections as gate frames, (3) the division of gate frames into student-controlled and teacher-controlled gates, and (4) the development of an answer booklet for the gated program including instructions for using the by-pass. Of the seventy-five gate frames, fifty-two were student-controlled and twenty-three were teacher-controlled.

The following materials accompanied the program: (1) an answer booklet for the gated form of the program, (2) an answer booklet for the ungated form, (3) a time-and-error record, (4) a student experience questionnaire, and (5) a student reaction form.

Students in two junior high school classes were selected as subjects for the study. The fifty-seven female students were members of first-year home economics classes. These students were randomly assigned to one of two experimental conditions: (A) using the clothing program with an opportunity to by-pass,

and (B) using the same program with no opportunity to by-pass.

The program was administered by the regular classroom teacher with occasional assistance from the researcher. After completing the program, the students responded to a series of criterion tests and a student reaction record.

Findings of the field test indicated no significant difference between students using the gated form of the program and students using the ungated form with respect to five variables related directly to mastery of program objectives. The mean times required to complete the program were 20.3 hours for the experimental group and 22.5 hours for the control group.

The average number of gates used by students in the experimental group was 81.2 per cent. When use of gates was compared to failure of associated criterion test items, it was found that students who used the gates had a mean error rate of 4.04 on the test items whereas students who were not given an opportunity to use the gates averaged only 2.86 errors on the same items.

Reactions toward programmed teaching and the gated program were generally unfavorable in both groups. Students did agree favorably that programmed teaching is good because students can work at their own pace without interruptions and know immediately if an answer is right or wrong. They also agreed that by-passing makes the program less boring for those who already know the information. However, the students also indicated that teachers can teach better than a program can teach and that programmed instruction is a boring way to learn.

EVALUATION OF BY-PASSING AS A TECHNIQUE FOR ADJUSTING A SELF-INSTRUCTIONAL CLOTHING PROGRAM TO INITIAL INDIVIDUAL DIFFERENCES

by

Mae Gregory Murphy

A Thesis Submitted to
the Faculty of the Graduate School at
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Approved by

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APPROVAL SHEET

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CHAPTER I

INTRODUCTION

Educators are constantly searching for new and more effective methods of instruction--methods which will provide for the personality and behavioral differences inherent in each group of students. The educator, in attempting to bring about a prescribed behavioral change in many students, often finds that such individual differences create difficulties in the achievement of objectives. Some of the more recent innovations in educational technology such as the ungraded classroom, team teaching, and programmed instruction appear to be making significant progress in dealing with the problem of individual differences in the classroom.

Programmed instruction, initially developed to provide efficiency of learning and economy of learning time, is effective in providing for individual differences in that each student progresses at his own speed and goes as far as is possible for him. A large number of programs has been developed in several subject matter areas, and many of these are concerned with individual differences.

In the brief history of programmed instruction, more attention has been given to the techniques of program development than to the use of programs in the classroom. The first step in program development is the compilation of a detailed

and comprehensive list of the behaviors or skills the learner should have acquired upon completion of the program. Proportionally less consideration has been given to the specification of those behaviors or skills which may be relevant to the programmed information and are already in the learner's repertiore and which, therefore, do not need repeating.

The successful use of programming may depend upon the ability of the programmer to incorporate the initial behavioral status of the learner into the sequence of instruction. It seems logical to assume that a program should not teach the student anything he already knows, but should teach everything he needs to know. Many programs now available are based on the assumption that students begin with no knowledge of the subject; however, it is known that many students have prior knowledge of the subject. For these reasons, the development of a program providing for differences in initial behavioral status was explored in this study.

Purposes of the Study

The purposes of this study were to initiate a "by-pass" system into the self-instructional clothing program and to appraise the "gated" program using a field test as a source of data. The by-pass system was considered necessary because the three-part clothing program was primarily designed for first-year home economics students having no previous experience with the sewing machine or with garment construction,

whereas an increasing number of students in Home Economics I has had previous sewing experience in junior high school, in 4-H clubs and in other such institutions, or at home. Thus, the first-year home economics class is composed of students having a wide range of prior experience. The by-pass system would enable a student having prior experience with the programmed information to skip those sections of instruction containing information or skills already mastered.

Appraisal of the "gated" program was necessary in order to determine whether or not the by-pass system developed was an effective means of accomplishing this individualization of the self-instructional clothing program. In order to evaluate the effectiveness of the by-pass system, information was needed concerning mastery of the programmed objectives. Evidence to be obtained in the field test included: (a) scores on a post-test of recall and understanding, (b) scores on a performance test of application and transfer, (c) workmanship scores on the garment constructed, (d) speed scores on the program, (e) scores on a delayed, written application test for retention of learnings, and (f) attitudes of the participating students with respect to their general feeling toward programmed instruction and their preference for the gated or ungated program. In addition to evaluating the gated program, the study was designed to gain information about the relative effectiveness of the by-passing technique in general and to secure empirical evidence of the relative efficiency of student

judgment in the use of a gated program.

Background for the Study

In the spring of 1962, a pilot study in the area of programmed instruction was initiated by the education staff in the School of Home Economics of the University of North Carolina at Greensboro. The education staff formulated plans for the development of programmed materials in the area of clothing construction since no such materials were available at the time.

During the summer of 1962, three graduate students attended workshops on programmed learning. Moore (13), one of these students, initiated a programmed sequence on the fundamentals of the use of the sewing machine. After early dissatisfactory attempts with a strictly linear format with verbal responses, the staff formulated performance objectives and experimented with various types of performance responses. They believed that actual performance at the sewing machine was necessary if the students were to learn to use the machine.

Because of time limitations, Moore discontinued the construction of frames and proceeded to field test the portion of the program which had been written. A preliminary field test was conducted to determine with which frames the students were having difficulty and whether the program contained sufficient performance frames to insure the student's ability to perform the terminal tasks (13, p. 50).

Findings of the preliminary field test were evaluated by Moore and five members of the Home Economics Education staff, and recommendations were made for a revision of the program. Following extensive work by the staff during the spring semester of 1963, further decisions were reached concerning the continued improvement of the program. The primary recommendations suggested were "clarification of some of the harder steps by the addition and rewording of frames, changing sequences of sections of frames, and writing additional frames based on the revised objectives of the Sewing Machine Program" (18, p. 3).

Based on these recommendations, the program was revised in the fall of 1963. Shoffner (18) continued the revision of the self-instructional program and field tested the revised program throughout 1963-1964. The revisions undertaken by Shoffner included the addition of: (1) performance frames, (2) sections of frames for objectives not programmed in the first edition, (3) colored frames for various models of sewing machines, (4) an introduction to programmed instruction for the students, and (5) a number of illustrations.

Field testing the program necessitated the construction of appropriate accompanying materials in order to provide adequate records for evaluating classroom use of the program. These materials included: (1) an answer booklet, (2) a time-and-error record, (3) a student information questionnaire, (4) a student reaction form, (5) a teacher reaction interview

record, and (6) evaluation devices prepared by Shoffner and the staff.

The first phase of a three and one-half year research project was initiated in the spring of 1964. Funded by the Research Branch, Division of Elementary and Secondary Research, U. S. Office of Education and designated Project No. 5-1042, the project was an attempt to develop programmed materials in the field of home economics and to appraise the programs using an experimental procedure.

In September, 1964, three members of the Home Economics Education staff at the University of North Carolina at Greensboro attended a workshop on programmed instruction conducted by the American Institute of Research on the University campus in Greensboro. The topics covered were: (1) formulation of program objectives, (2) the writing of frames to meet these objectives, (3) administering a program to students, and (4) the revision of frames in preparation for a field test. Following the workshop, plans were made for revision of the Sewing Machine program, which was to become Part I of the larger self-instructional program in clothing construction, and for developing Part II and Part III.

Two graduate students chose as thesis problems the development of objectives and definition of subject matter for Parts II and III under the supervision of members of the clothing staff at the University. Frames, based on these objectives, were written for Parts II and III.

Concurrent with the development of program frames, the evaluation devices needed for field testing the completed program were developed. These evaluative materials included: (1) a paper-and-pencil test of knowledge of basic facts, (2) a one-hour performance test of ability to use the sewing machine, (3) a three-hour performance test of understanding of patterns and ability to transfer learnings and perform basic construction processes, (4) a written test of achievement of higher level objectives, and (5) an extensive evaluation device for measuring quality of workmanship on the blouse.

The completed program consisted of nine program booklets and 772 frames. Part I, The Sewing Machine program consisted of 219 frames with two sections covering the types of sewing machines, the parts of the sewing machine, and basic techniques in using the sewing machine. The 223 frames in Part II, The Pattern program, included information on body measurements, figure types, pattern selection and the pattern envelope, the preparation of fabric, understanding of pattern markings, laying the pattern on the fabric, and the techniques of cutting and marking. Blouse Construction, Part III, had 330 frames and its topics included staystitching, bridgestitching, pressing, darts, plain seams, facings and attaching facings, sleeves, and hems. While responding to Parts II and III of the program, each student was guided in the construction of a blouse. A set of exhibits and panels accompanied the program for further clarification of concepts.

The program was printed and assembled during the summer and fall of 1965 in preparation for the field experiment of Project No. 5-1042.

Definitions of Terms Used

The need for common definitions in the area of programming as in other newly-emerging disciplines has become apparent to many educators and psychologists. There has been an attempt in recent months to eliminate much of the confusion in the field but some programmers continue to use two, three, and even four terms synonymously. For the purposes of this study, the writer has chosen to use one term and one definition except in instances where the use of two or more terms facilitates expression of the exactness of a concept.

Program: the sequence of tested frames leading the student to mastery of a subject with a minimum number of errors. It is synonymous with self-instructional program, auto-instructional program, self-tutoring device, and self-teaching device.

Frame: a simple instructional unit which the student considers at one time. It varies in length from one sentence to one page of material and usually concludes by requiring a response from the student. It may or may not include an illustration.

Programmed Instruction: the method of instruction in which the program becomes a tutor for the student. It is

designed to lead the student through a set of specified behaviors which makes it more probable that he will behave in a given way. This term is synonymous with automated instruction.

Programming: the process of arranging the specified material into a series of small steps, specifying the kind of response to be made by the learner and providing for the reinforcement of the correct response.

Programmer: the person responsible for developing the program. The programmer may be a subject-matter specialist, a psychologist, a person trained in programming techniques, or a combination of these.

Linear Program: a program in which an ordered sequence of frames is presented. In this program the student must construct a response and receive immediate reinforcement of the correct response. The term is snynonymous with Skinnerian program, constructed response program, and sequential program.

Branching Program: a program in which the sequence of exposure is determined by the student's response to each frame. The branch usually consists of a single item which explains why a particular answer is incorrect and returns the student to the original frame for another try. It is synonymous with multiple-choice program and intrinsic program.

Gated Program: a program in which the amount of exposure is determined by the student's response to a by-pass or gate frame. Use of the gate frame provides the student with a short route through the programmed material because he skips what he already knows. This term is synonymous with by-pass program and short-route program. In this study the term refers to the original clothing program with minor changes and the short route indicated in an accompanying answer booklet.

Ungated Program: the original clothing program developed in Project No. 5-1042. It does not provide the student with a short route through the programmed sequence.

By-passing: a technique used to permit a student to by-pass or skip a section of instruction if he has mastered the information in that section of the program. The term is snyonymous with gating.

Gate Frame: a frame which requires the student to make a response on the basis of which his eligibility to by-pass a section of the program is determined. The term is synonymous with by-pass frame. A student who responds correctly to all gate frames is thus provided with a short route through the program.

By-pass Control: the procedure used to appraise the student's performance on the gate frame and the method used to

determine his eligibility to skip a section of the program.

Student-controlled Gate Frame: a gate frame to which a student responds and on the basis of this response decides for himself whether to by-pass or work through a section of the program.

Teacher-controlled Gate Frame: a gate frame to which a student responds and on the basis of this response the teacher tells him whether to skip or work through a section of the program.

Criterion Frame: a frame that tests whether the student has learned material from previous frames. It is synonymous with test frame.

Performance Frame: a single instructional unit or a statement which directs the student to carry out some task other than constructing a written response. It may be considered a frame requiring one type of overt response.

Panel: a visual aid which the student can see, feel, or manipulate and to which he is referred at some point in the program. It may be a chart, a graph, a diagram, a piece of fabric, or a passage of text.

Error: the incorrect or non-appropriate response to a specific stimulus in a frame of the program.

Target Population: the population of students for whom the program is prepared.

Terminal Behavior: the behavior that a program is designed to induce.

Pacing: the rate at which the student proceeds through the program. Most programs are self-pacing. The student reads and responds at his own rate, depending upon success on the previous frames and upon previous knowledge.

Previous Experience: any prior experience with information in the program which results in partial achievement of some of the objectives of the program.

Initial Individual Differences: those differences in students at the commencement of programmed instruction.

Initial Behavioral Status: the status of the student with respect to his previous achievement of terminal behaviors which are specified as objectives of the program.

Criterion Examination: a test or examination administered to the student at the completion of a program or during the development of a program to determine how much the student has learned. It may be in the form of a paper-and-pencil test or a performance test.

Organization of the Thesis

The remainder of this thesis will include a review of the literature related to the principles of programmed instruction, the techniques of programming which provide

for individual differences, and the conclusions of various authorities on the success or failure of programs in providing for individual differences, and a description of the present study. The description of the study includes (a) the procedure used in developing the gated program and in field testing, (b) the findings obtained from the field test of the gated program, and (c) a summary of the study. Recommendations are included for revision of the self-instructional clothing program, classroom administration of the program, and revision of the by-pass system.

CHAPTER II

REVIEW OF LITERATURE

The search for new and more effective methods of instruction which will provide for individual differences is a continuous one. Significant progress has been made in some of the more recent educational innovations such as the ungraded classroom, team teaching, and programmed instruction. In this chapter, the researcher will review the principles and characteristics of programmed instruction, a description of various techniques used to adjust programs to individual differences, and the conclusions of various authorities on the success or failure of programming in providing for individual differences.

Principles and Characteristics of Programmed Instruction

In the late fifties a new medium, referred to as programmed instruction, made its appearance. Since its inception, programming has been the subject of much criticism and praise. Programmed instruction is based on B. F. Skinner's research on the operant-conditioned learning of animals in the psychological laboratory. The principles of programmed instruction generally stress,

(a) feeding instruction to the learner in very carefully selected and sequenced bits,
(b) requiring the learner to make an active response to questions that are so heavily

prompted that the answer is obvious, and
(c) reinforcing this almost always correct response by revealing the right answer immediately (22, p. 29).

Two general types of programs can be identified, the linear and the branching. Skinner is given credit for originating the linear program and for verbalization of the reinforcement theory back of programming. Through reinforcement, the desired response is shaped. The first branching program was developed by Crowder who took issue to some extent with Skinner's theory of operant conditioning.

The Linear Program

The linear program consists of a fixed sequence of frames with questions to which students respond by constructing an answer or filling in one or more words. The essential elements of a linear program are summarized effectively by Schramm as,

(a) an ordered sequence of stimulus items,
(b) to each of which a student responds in some specified way,
(c) his responses being reinforced by immediate knowledge of results,
(d) so that he moves by small steps,
(e) therefore making few errors and practicing mostly correct responses,
(f) from what he knows, by a process of successively closer approximation, toward what he is supposed to learn from the program (16, p. 2).

Reinforcement theory is the backbone of linear programming. The student responds and then compares his response to the preferred response. If his response matches the response in the program, he feels rewarded, and the behavior is likely

to recur. According to Crowder (6, p. 145), "in linear programming, the student's response is considered an integral part of the learning process; the response is induced in order that it may be rewarded and learning thus occur."

In linear programs there is no provision for errors made by the student. Proponents of the linear theory hold that errors are not relevant to the learning process. If a student makes the wrong response, the program has wasted his time, or, even worse, allowed him to have harmfully practiced the incorrect response. An error made by a student on a linear program is considered to be a fault of the program.

The Branching Program

The basic structure of a branching program is quite simple. Founded by Crowder (5, pp. 109-116), it differs from the linear in its flexibility.

The format of a branching program requires that the student's choice of an answer to a multiple-choice question be used automatically to direct him to new material. The new material is usually information intended to lead the student to the next step in reaching the objective, or is information intended to correct an error made by the student.

A branching program may be presented in an electronic type of teaching machine or in the form of a scrambled book. The first frame of a scrambled book includes a unit of information and a multiple-choice question. After each of the

alternative answers, a frame number is listed. The student chooses the answer he believes to be correct and then turns to the frame to which he is directed. If he has chosen correctly, the frame will reinforce his answer and directly refer him to the next frame for new information. Otherwise, the frame informs him of the reason his answer was not correct and refers him to the original frame where he will select another alternative. In this way, the student cannot continue the program until he has made the appropriate selection for each multiple-choice question.

Developers of the branching program believed that the student should be permitted to make errors because such errors are indicative of student misconceptions which need to be corrected. In this type of program, the programmer must anticipate every move of the learner and actually provide for errors.

The multiple-choice questions in a branching program may serve a variety of functions. Crowder said,

> A routine question on a routine step in the program should serve to:
>
> a. determine whether the student has learned the material just presented;
> b. select appropriate corrective material if the student has not learned;
> c. provide desirable practice with the concept involved;
> d. keep the student actively working at the material; and,
> e. presumably, if the student gets the question right, serve a desirable motivational purpose (7, pp. 3,4).

The similarities between linear and branching programs are many but as Lumsdaine noted, "despite all these similarities, the differences between the two approaches are very important and are in some ways fundamental" (9, p. 43).

Techniques Which Adjust Programs to Individual Differences

Techniques in programming have been developed which offer alternative solutions to the problem of adjusting programs for individual differences in knowledge of subject matter. These fall in three classifications: (1) Modifications of linear programs, (2) Branching programs, and (3) By-pass techniques.

Modifications of Linear Programs

Lysaught and Williams (10, pp. 70-91) described three modifications of linear programs which have provisions for individual differences. These are: a simple modified linear program, a linear program with sublinears, and a linear program with criterion frames.

A modified linear program may be selected when there are considerable differences in ability levels among students. When the subject matter necessitates much review for the slower students, the program provides a form of drill for them. To meet the needs of faster students, the modified linear program provides for skipping the review sequences.

The second modification described by Lysaught and Williams involves a linear program with sublinears. It

consists of a format which allows for enrichment material for the rapid student, if he so desires. In this type of program, the linear sub-program can be taken by students who desire additional information and who can then return to the main program.

Linear programs have also been modified by the addition of criterion frames which provided a long and a short route. The student is guided in his decision of which route to take by his success or failure in answering specified criterion frames. The short track consists of a series of criterion frames to determine if the student understands the programmed material without the detail included in the longer track through the program. When the student responds correctly to the criterion, he skips to the next sequence, since the criterion frame showed that he had previously mastered the material in this section of frames. In this instance,the criterion frames are used to assist students in selecting the track best suited to their ability. For example, one track can be made available for students having excellent backgrounds in the subject matter and the other track can contain review and developmental frames for the student who has an inferior background.

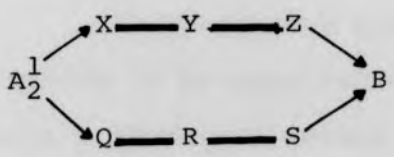
Branching and By-Passing Programs

Crowder described his intrinsic or branching program as providing different amounts and kinds of learnings for

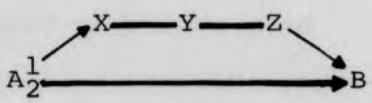
individual students. However, the kind or amount the student receives is based not on prior estimations of his needs nor on his self-evaluation as he responds to the program but on his performance in choosing answers to the multiple-choice questions. As Crowder explained,

> The central feature of intrinsically programmed materials--the fact that each piece of material seen by the students, whether it be new or remedial material, depends on his performance on the previous question--is intended to serve this end of adapting the material to the manifest needs of the individual students (6, p. 149).

There are many methods of developing branching sequences. Markle (12) diagrammed two basic methods of branching (see the illustration). She explained that Question A provides the student with two choices. "When his choice indicates a need for review, we might send him through a 'remedial' branch. Where his choice indicates a preference or opinion, we can send him through 'parallel' branches (12, p. D83). In the diagram, response A^1 indicates the parallel or remedial branch. In the parallel branch, the student merely receives additional information; the remedial branch helps the student review those learnings which he does not understand.



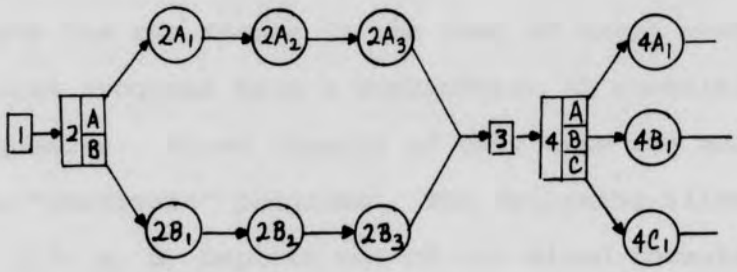
"Parallel"



"Remedial"

Branching and by-passing have both been generally and indiscriminately referred to as branching. Shettel's explanation (17) of the two techniques clearly pointed out the distinctive features of each. He discussed them under the headings (1) parallel branching and (2) by-passing.

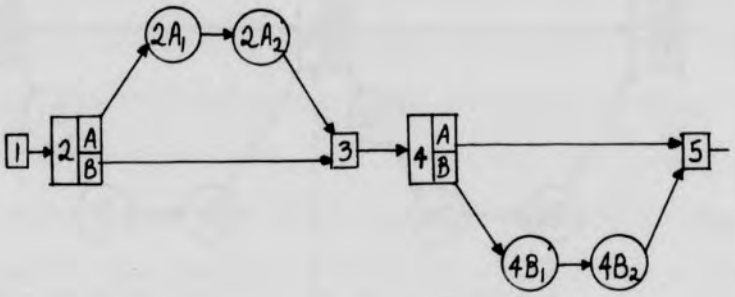
(1) Parallel branching: In this form, separate but parallel sequences are developed. A student takes a particular track depending on some aspect of his performance prior to the parallel separation of the program sequences. Ultimately, he responds to a frame common to all the students. Shettel (17, p. 4) represented a simple form of parallel branching as follows:



Frame 2 has two parallel tracks. Three parallel tracks are provided at Frame 4. The programs with parallel branches are not limited in the number of sequences.

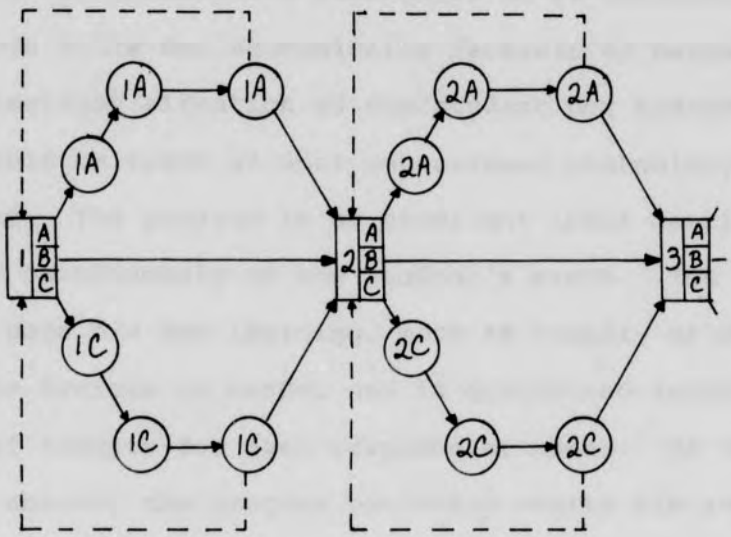
(2) By-passing programs: Multiple paths are also provided in by-pass sequences. However, one sequence represents a short-cut around the other material or, conversely, the other sequences are loops of extra work. Again, based

on some aspect of previous performance, it is determined whether the student be required to respond to the additional material or go around it. Shettel's format (17, p. 5) for the single loop by-pass could be illustrated thus:



A student who selects the B response to item 2 would go directly to item 3 using the by-pass. If he selects A, he would take the two frames in the loop of extra work.

Some programs have a combination of parallel and by-pass sequences. Mixed formats of this type are most commonly found in "intrinsic" programs. The following illustration by Shettel (17, p. 5) depicts one of the mixed formats. (See the following page for the diagram). In the illustration, the B path is a by-pass sequence, taking the student directly to the next topic. The A and C paths are parallel branching sequences. The dotted lines indicate that the student who takes a branching sequence is frequently returned to the original frame to repeat that item. Presumably, the student would respond appropriately to the item the second time and then move directly to the next topic.



As noted earlier, there could be more than two such parallel branching sequences. Also, these parallel sequences need not be equal in length, and one could even branch or by-pass within the parallel sequences themselves.

Success of Programs in Providing for Individual Differences

Teaching machines and programs were welcomed as the great solution to the persistent problem of providing for individual differences. According to Schramm,

> The hope has always been that programs would be the major key to the door of individualized instruction--that they would liberate a student from the lockstep of a heterogenous class, let him move forward at his own best pace and go as far as he can, release teachers from much of the routine of exposition and drill and let them concentrate on smoothing and enriching the progress of individual students (15, p. 12).

It is virtually impossible for a teacher to cope with

the multitude of differences with which he is confronted daily. Since it is not economically feasible to perpetuate the ideal learning situation of one student per teacher, advantage should be taken of what educational technology is now offering. The program is an excellent tutor gearing its instruction continuously to the student's needs. The individual can pace his own learning, move as rapidly or as slowly as he desires or needs, and is guaranteed immediate knowledge of results for each response he makes. If the student is absent, the program patiently awaits his return and can even follow the student home. The student is liberated from dependence on an overworked instructor who cannot find enough time for his individual needs (8, p. 347).

The initial claims were promising; however, closer inspection of the programs and subsequent research have left many with doubts about the success of programs in providing for individual differences. The majority of programs present the subject matter in a fixed sequence of steps with no provision for varying the sequence to meet the needs of various students. According to Skinner (21, pp. 137-158), a carefully programmed sequence does permit sufficient flexibility in terms of speed or rate of learning. The quick learner goes through the programmed materials more rapidly than the slow learner. He sees little advantage in dropping or adding items for students.

Crowder (5, pp. 109-116) stated that his flexible or

"intrinsic programming" is advantageous in that each program is adapted directly to the individual's present state of knowledge. His adaptable program provides parallel branches which depend on the student's answer to a particular set of items.

A study by Coulson and Silberman (4, pp. 135-143) investigated the branching variable. In the experimental group in which the branching program was used, the exact number and sequence of frames were not fixed but were dependent on the student's response whereas in the nonbranching group, the student simply reacted to each of the frames in fixed order. Coulson and Silberman found no significant differences in performance between the two experimental groups though the students in the branching group spent less total time with the material than did the nonbranching subjects.

Using a computer as a control unit in a similar follow-up study, Silberman and others (19, pp. 166-172) again found no difference between the branching version and the fixed-sequence version of a logic program. Coulson and others (3, pp. 1-8) modified the remedial items and the branching structure of this same program. When compared with the fixed-sequence version, superior learning was indicated for those using the branching version. It was concluded that the branching programs provide for individual differences by incorporating a variety of criteria, such as rate and type of errors, for branching to additional remedial items or for

skipping over redundant items. It is thus assumed that different learners require different items and varying amounts of repetition at different times during the sequence of the program.

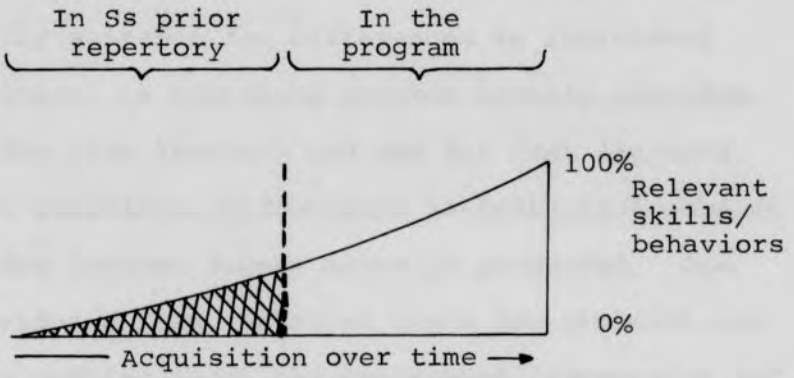
Campbell (2, pp. 1-38) attempted to evaluate the effectiveness of branching versus linear programs in dealing with individual differences. He compared a branching program with three linear programs of different length and found no significant differences on a post-test. In a comparison between a branching and a linear program, Mager (11, pp. 104-107) found superior performance on the part of the students in the linear group on a calibration task but these students had taken more time to learn the task than did the students who used the branching program.

Comparisons have also been made between programs in which students were allowed to move at their own pace and programs in which the student was required to move at a pace set by the experimenter. Two studies conducted by Briggs and others (1) and Silverman and Alter (20) found no significant difference in learning between the student-paced and the experimenter-paced groups.

Roe (14, pp. 407-16) compared two kinds of branching methods with a linear program using seven groups of college freshmen in 1962. He found no significant difference in either learning time or criterion test scores between the forward branching and the linear method. It was concluded

that the simple branching procedure did not, by and large, seem to be more effective than the linear method. Roe was careful to recommend that further investigation be made into more complex branching procedures.

Shettel states that, in general, linear programs have been adapted to individual differences in that they are self-pacing but the sequences are identical for everyone. It is thus extremely difficult to adjust the program to the student's behavior when he begins the program.



A program cannot begin at "zero" knowledge and skills. The programmer must make certain assumptions regarding prior experience of the student. At the very least, the programmer must assume that the student can read and understand materials. From Shettel's diagram (17, p. 2) above, one can see that each student acquires a certain amount of knowledge and skills prior to contact with the program. However, students differ in the amount they have acquired which is relevant to the subject matter being programmed. The question arises as to what can be done to adjust the program for those students who have, because of previous exposure and experiences,

acquired various amounts of knowledge about the subject matter in the program (17, p. 2).

Shettel noted that a "strictly linear program would have to 'solve' this particular kind of problem by forcing all students to start with the skill needed by the 'worst' student" (17, p. 2). Using this format, part of the students would be forced to go through material with which they were already familiar.

The branching format does not allow students to skip material but only to cover the material in different ways; it is especially suitable for differences in individual learning abilities. A branching program usually provides one sequence for slow learners and one for fast learners. When there are individual differences in individual subject matter knowledge another format might be preferred. One exception provides a long, detailed track for students who know little or nothing about the programmed information and another short, less detailed track for those who have had previous experience with the subject matter.

Shettel commented that the by-passing format more suitably lends itself to differences in subject matter knowledge because of its provision for skipping ahead or by-passing certain information. He explained that the student who meets the criterion level of mastery for the topic in question is permitted to by-pass and the student who fails to meet the criterion level must respond to all frames in the sequence. When comparing branching and by-passing

formats, Shettel suggested

> While less sensitive than the parallel form discussed previously, the potential for time saving is greater and the construction of the item leading to the choice of by-pass or no by-pass is somewhat simpler. ...In general, by-passing has features that are well-suited to the accommodation of individual differences in initial proficiency (17, p. 7).

Shettel concluded that linear programs have no provision for adjustment to prior knowledge differences and that pure parallel branching has only limited utility in this respect. It seems that

> ...differences in initial knowledge level and in learning ability may best be handled by a combination of two forms of branching using small step multiple-choice formats; and that the best overall approach to the single problem of knowledge differences appears to be the by-pass format (17, p. 9).

CHAPTER III

PROCEDURE FOR PREPARING AND FIELD TESTING THE GATED PROGRAM

Purpose of the Study

The purpose of this study was to develop a short route through the self-instructional clothing program for students having previous experience which resulted in partial achievement of the program objectives. The incorporation of a by-pass technique in the program format was to be used to provide the short route. A field test was necessary to determine if the resulting gated programs were an effective means of accomplishing this adjustment **without** tampering with the achievement of the original objectives of the program. The original objectives were that each student, upon completion of the program, would use a sewing machine effectively, use a commercial pattern with some skill and understanding, and be able to perform the basic processes of garment construction.

Preparation of the Gated Program

Gating of the clothing program began in the fall of 1965. In its original form, the program consisted of three parts: (1) The Sewing Machine program with 219 frames, (2) The Pattern program with 223 frames, and (3) the Blouse Construction program with 330 frames. The 772 frames were

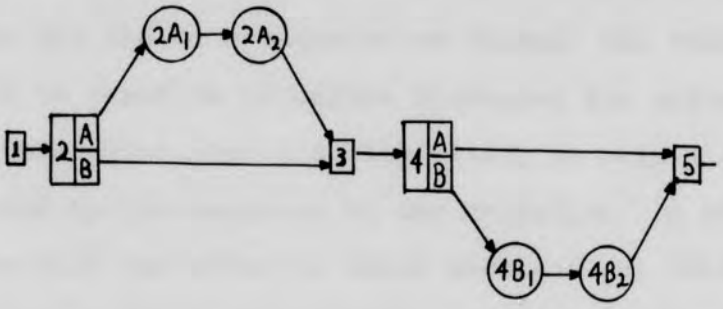
divided according to content into nine program booklets. The program was accompanied by a set of panels and exhibits used as visual aids to assist in the clarification of the programmed information. When the decision was made to gate the entire program, a timetable was set up for preparing the gates and conducting the field test.

The primary objective was adjustment of the program for those students having prior experience with information relevant to the program which resulted in partial achievement of the program objectives. The most effective method of by-passing was considered to be one which met the following criteria:

1. allowed each student to spend the amount of time he required to master the information.
2. permitted the experienced student to skip those sections of frames containing learnings already in his repertoire.
3. provided complete exposure to all learnings for the inexperienced student whose knowledge and skill repertoire is less complete.
4. permitted the experienced student to complete the programmed sequences in less time than the inexperienced student.

A parallel by-pass form with a single loop was selected to provide the short route through the program. The format essentially consisted of two paths or tracks which could be

represented thus:



One path, B, represents a short-cut or by-pass around the previously mastered material. The student's performance on the gate frame (2 or 4 in the representation) determined whether he should be required to go through the additional material or by-pass it.

The learnings in the program were thoroughly reviewed to determine the most strategic location for the gate frames. The frames are referred to as gate frames because they open and shut like a gate. If the student successfully passes the criterion, the gate opens and he is allowed to skip that section. If he fails the criterion, the gate remains closed and the student must complete all the frames in that section. It was believed that a student should not be allowed to by-pass any learnings which he had not thoroughly mastered; thus, frequent gate frames and short by-pass sequences involving small segments of programmed material were needed. An example of how the gate frame operates is shown in Appendix A.

The linear format of the self-instructional clothing program lent itself readily to the addition of these gate frames.

In most instances, the criterion frames already present were used as the gate frames. Instead of reacting to the criterion frame at the end of a sequence of frames, the student was instructed to react to it before beginning the sequence. It was at this point that his eligibility to skip a section was determined by his response to the criterion. A gate frame was developed and added in those sections for which no criterion frames had been included. Of the seventy-five gate frames, fifty-eight were criterion frames already present and seventeen were newly-developed gate frames. Both written and performance responses were used as criteria in the gate frames.

The gate frames were divided into student-controlled gates and teacher-controlled gates in order to evaluate the effect of student judgment in the decision to use the long or short route. In the student-controlled gates, the student completed the criterion and decided for himself if he should by-pass the section. The teacher-controlled gates (indicated by a diagram of a hand on the individual frame) involved having the student complete the criterion and then call the teacher, who decided if the student should by-pass the section of frames. Of the twenty-four gates in Part I, fifteen were student-controlled and nine were teacher-controlled. Part II contained twenty-six gates; seventeen were student-controlled and nine, teacher-controlled. Part III contained twenty-five gates; twenty student-controlled and five teacher-controlled.

Gating of the program was undertaken after the clothing program was already in printed form ready for the field experiment of Project No. 5-1042. It was believed that the printed programs should not be altered by the addition of the gate frames until the by-pass format had been evaluated. For this reason, and to facilitate the preparation of the gated program for the field test, the short track through the program was indicated in a supplementary answer booklet. All instructions for by-passing were handled in this manner. The gate frames were printed and manually inserted only in those programs to be used in the field study of the present investigation. It was believed that this approach was best since the gates could easily be removed if the by-pass system failed to decrease the amount of time required by students for completion of the program. Preparation of the gated program and its supplementary answer booklet were completed in December, 1965, and January, 1966.

Supplementary Materials for Field Testing

The materials developed and used by Moore, Shoffner, and the Staff of the U. S. Office of Education Project No. 5-1042 at the University were available for use in the present study. These supplementary materials included: (a) a questionnaire devised to learn whether the student had had previous experience with the sewing machine or with construction processes, (b) a written criterion test based on the objectives of the program which had been used both as a pre-test and a

post-test and in this study also as a delayed retention test, (c) a three-hour performance test on the sewing machine and basic construction processes, (d) a delayed paper-and-pencil application test measuring the student's ability to transfer learnings, (e) a time-and-error record form on which students could record time spent and errors made, and (f) a student attitude questionnaire for recording the student's general feeling toward programmed instruction and his preference for gated or ungated programs. Examples and descriptions of these materials as used in the present study are included in Appendix B.

Answer booklets were developed and mimeographed for both the gated and ungated forms of the program. The ungated answer booklet contained numbers and answer blanks corresponding to the frames in the program. The answer booklets for the gated program followed the same format but also included instructions for using the short track through the program. The short track or by-pass system was indicated in the left margin of each page of the accompanying answer booklet with numbers and response blanks corresponding to the frames in the program. An example of the answer booklet for the gated form of Part I is shown in Appendix C.

The blouse evaluation device developed in part by a graduate student in 1963-1964 and later modified was used for evaluating the blouses constructed by the students in the field study. Each blouse was given a score of zero to three on each

of 120 items. The 120 items were related specifically to quality of workmanship on the garment. An example of the device as used in this study is found in Appendix D.

Field Testing the Gated Program

Selection of Subjects

Concurrent with the development of the gated program a search was undertaken for classes of first-year home economics in which the program might be administered. The gated program was designed for use with classes which contained some students having no experience with the programmed information and some students having previous experience with the programmed information. Following extensive contact with home economics teachers in the Greensboro vicinity, two first-year home economics classes in a junior high school in Greensboro, North Carolina, were selected for inclusion in the study. The two classes were taught by the same teacher. Class 1 was made up of twenty-eight students and Class 2, of twenty-nine students.

Grouping Students

The experience questionnaire was given to each of the students in order to rate the degree of experience of each. The fifty-seven students were then randomly assigned to one of two experimental conditions: (A) using a program with an opportunity to by-pass and (B) using the same program with no opportunity to by-pass. Students in (A) and (B) will hereafter be referred to as the experimental group and control

group, respectively. Because of the random assignment both Class 1 and 2 were made up of experimental and control sections. Comparisons were made between students in the experimental and control sections; however, no comparisons were made between the two classes.

Personnel Administering the Program

The researcher took the program and the supplementary materials to the school on the first day of the field test. The regular classroom teacher was in charge of administering the programmed sequences. Directions for use by the teacher accompanied the program; however, frequent visits to the classroom were made by the researcher to clarify instructions, to take supplies, and occasionally to assist with the appraisal of student performance on frames.

Instructions to the Teacher

The regular classroom teacher was in charge of the administration of both the gated and ungated forms of the program since she was in direct charge of the two classes. The teacher was given oral and written instructions. The written instructions included a description of the program sequences and objectives, a list of the supplies needed by each student, directions for preparing the sewing machines, an explanation of frames to be appraised by the teacher, and a set of the gated program and accompanying answer booklets.

The instructions and supplies were given to the teacher one month prior to the field testing. The teacher was asked

to study the directions and the program in order to be fully prepared to administer the program during the field test. It should be noted that the regular classroom teacher was relatively untrained in research procedures.

Instructions to the Students

Oral instructions were given the students by the researcher on the day preceding the initiation of the programmed unit. Using the same procedure for both classes, the experimental and control groups were divided so that instructions could be given to them separately. Each group was told that their sequence of instruction differed from the sequence of the other group and that, for this reason, they need not be concerned with the progress of any other student. They were also told that upon completion of the programmed text the two groups would be compared.

Classroom Set-up

One of the limitations of the present study was in the size of the classroom and the number of machines available for use by the students. The size of the classroom was inadequate to accommodate twenty-eight or twenty-nine students and only eight sewing machines were available. Since Part I of the program required that only one student work at a sewing machine, it was necessary to allow part of the class to begin with Part I, The Sewing Machine program while the remaining students began with Part II, The Pattern program. As a student finished with a given machine, another student would take her place and work

on Part I. For Part III of the program, four students in each class furnished portable models of sewing machines and the remainder of the students were assigned three to each machine. Although crowded, the latter situation was necessary.

Each student was assigned a small tray in which she kept her answer booklet and time records, the sewing machine diagram, pattern, fabric, and supplies. The program booklets were returned each day to the central storage area for use by the second class involved in the study. The panels and exhibits were centrally located in order to be immediately accessible to each student.

Other supplies given to each student were two spools of thread in contrasting colors, ten six-inch squares of muslin, a ruler, and ruled paper. The researcher supplied the thread, the squares of fabric, and the pattern. Patterns were later paid for by the individual students. The classroom teacher was responsible for collecting and distributing the remaining equipment as needed by the students.

Sequence of the Field Test

The experience questionnaire and the pre-test were administered to the students by the researcher on the first day. On the second day, the researcher instructed the experimental and control groups in the use of the programmed text.

The students responded to the programmed material for six consecutive school weeks and kept daily time records. Upon completion of the programmed text, each student had

constructed a blouse which was taken to The University for scoring by university students trained in the use of the blouse evaluation device.

At the conclusion of the six-week period, each student was given a written post-test on the ability to use the sewing machine and to perform basic construction processes. For use in the present study, the three-hour performance test was modified for administration in two regular class periods since neither funds nor transportation was available for bringing the students to the school on Saturday. Each class was randomly divided into two sections for the criterion tests. One section, under the supervision of a member of the Home Economics Education staff, completed the written test and the student reaction form. The other half of the class, under the direction and supervision of the researcher, completed the performance test. Five weeks following the completion of the field test proper, students in the experimental and control groups were given an unannounced written test measuring the student's retention of ability to apply principles, analyze problems, and make judgments based on learnings in this area.

CHAPTER IV

ANALYSIS OF DATA

The data obtained from the field test of the gated clothing program are discussed in this chapter. Quantitative summaries of the field test data are expressed with respect to: (1) scores on the written post-test, (2) gain scores after completion of the program, (3) scores on the two-hour performance test, (4) workmanship scores on the blouse, (5) scores on the delayed paper-and-pencil test, and (6) time required to complete the program. A summary is also made of the number of gates used by the students in the experimental group and the desirability of such gating relative to mastery by the students of program objectives. Student reactions to programmed teaching and to the gated program are presented in the final section of the chapter.

The objectives of the gated program differ from those of the original program in only one respect: it is expected that those students using the gated program will require less time to complete the programmed text. It should be noted then that no significant difference will be expected between the experimental and control groups with respect to variables one through five above. Gating the program will be considered useful only if a significant difference between groups is indicated for variable six.

Description of Students

Prior experience with information in the program was recorded in an experience questionnaire (see Appendix B). The questionnaire was administered to each of the fifty-seven students included in the study. Each student was given a score of zero to eight according to the degree of previous sewing experience. Twenty-nine students in A, the experimental group, and twenty-eight students in B, the control group, completed the questionnaire. For each group the range of scores was zero to eight indicating that some in each group had had no experience and some had had extensive experience.

The mean experience score for Group A was 5.75 and for Group B was 5.57. A frequency distribution (see Table I) showed the experience rating of students in the A and B groups.

TABLE I

DISTRIBUTION OF PRIOR EXPERIENCE IN EXPERIMENTAL & CONTROL GROUPS

Experience Rating	Frequency Group A N = 29	Frequency Group B N = 28
0	2	2
1	2	2
2	0	0
3	0	0
4	6	6
5	0	0
6	4	5
7	2	4
8	12	9

Nineteen students or 65.5 per cent of Group A and eighteen students or 64.2 per cent of Group B had an experience rating of six or above indicating they had constructed three or more garments with or without help. Two students in each group indicated no previous experience with the programmed information. Twenty-seven students or 93.1 per cent of Group A and twenty-six students or 92.8 per cent of Group B had used a sewing machine previously. Thus the two groups differed very little with respect to initial knowledge of the subject matter prior to administration of the treatment.

Variables Related to Mastery of Programmed Information

Variables which were considered to be related to the student's mastery of the programmed information were:

1. scores on the written post-test,
2. gain scores after completion of the program,
3. scores on the two-hour performance test,
4. workmanship scores on the blouse, and
5. scores on the delayed paper-and-pencil test.

These variables were analyzed using single classification analysis of variance. The 5 per cent level of significance was selected as the point beyond which a null hypothesis would be rejected.

It seemed probable that students having the same degree of experience might finish the program with approximately the same degree of mastery regardless of the number of sections by-passed by those in Group A who were given

the opportunity to by-pass. This was assuming that students skipped only those sections in which they responded successfully to the criterion frame.

It was hypothesized that students using the gated form of the program would not differ significantly from students using the ungated form of the program with respect to each of the five variables listed previously. When the post-test scores were analyzed (Table II), the F value was .62, a number which was not significant at the 5 per cent level of significance. Therefore, the null hypothesis was not rejected.

TABLE II

ANALYSIS OF VARIANCE OF POST-TEST SCORES

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F
Between experimental and control	1	38.05	38.05	.62
Within groups	55	3361.99	61.13	
Total	56	3400.04		

There was insufficient evidence to indicate that students who reacted and responded to all frames have mastered the information more adequately than those who were permitted to by-pass major segments of it. It should be noted that some of the students in the experimental group did not always choose to by-pass.

Analysis of variance of the gain scores made by the students in each group resulted in an F value of 1.23 which is not significant at the 5 per cent level of significance (Table III). The null hypothesis is not rejected and the

TABLE III

ANALYSIS OF VARIANCE OF GAIN SCORES

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F
Between experimental and control	1	53.87	53.87	1.23
Within groups	55	2399.85	43.63	
Total	56	2453.72		

conclusion is reached that the evidence is insufficient to indicate completing the long form of the program is superior to completing the gated program in terms of quantity of learning. In other words, the student who did all the frames did not necessarily learn more than did the student who by-passed those frames in which he already knew the information.

An additional measure of student mastery was obtained through the administration of the two-hour performance test. When the performance test scores were analyzed (Table IV), no evidence was found in this sample to indicate a difference between the experimental and the control groups with respect to mastery of learnings in the program. The F value, .89, is not significant at the 5 per cent level; therefore, the

null hypothesis was not rejected. There is insufficient evidence to indicate that the groups differed with respect to mastery of the programmed objectives.

TABLE IV

ANALYSIS OF VARIANCE OF WEIGHTED PERFORMANCE TEST SCORES

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F
Between experimental and control	1	61.86	61.86	.89
Within groups	55	3823.41	69.52	
Total	56	3885.26		

The hypothesis that students who use the gated program do not differ significantly from students who use the ungated program with respect to program mastery was further supported by an analysis of the workmanship scores on the blouse (Table V).

TABLE V

ANALYSIS OF VARIANCE OF BLOUSE SCORES

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F
Between experimental and control	1	8.91	8.91	.02
Within groups	55	23,911.31	434.75	
Total	56	23,920.21		

The F value was found to be .02, while the 5 per cent level

is 4.04. This indicated that there was no siginficant difference between blouse scores of students in the two groups.

The delayed paper-and-pencil application test was administered to obtain a final measure of student mastery, in this instance, a measure of student retention of program learnings. An analysis of the retention test scores (Table VI) resulted in an F value of 1.26 which, again, was not significant. The evidence was insufficient to indicate that using the short route resulted in more rapid deterioration of learnings than using the long route.

TABLE VI

ANALYSIS OF VARIANCE OF RETENTION TEST SCORES

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F
Between experimental and control	1	192.23	192.23	1.26
Within groups	55	8550.98	155.47	
Total	56	8746.21		

Time Required to Complete the Program

It was hypothesized that students using the gated program would complete the programmed sequence in less time than students using the ungated program. The very nature of the gated program, with its provision for a short route through the learning experiences, seemed to indicate the probability of such an occurrence.

The total time in minutes needed for completion of each of the three parts of the program was summed for each student in the experimental and control groups. The majority of the students worked on the program only during the home economics class period; others supplemented this time with a study hall period or during supervised after-school work. Each of the three program parts will be dealt with separately in this section and then an analysis will be made of the time required to complete the total programmed text.

Part I required a relatively short time to complete. When the times required to complete Part I were analyzed (Table VII), the F value was .15, a number which did not

TABLE VII

ANALYSIS OF VARIANCE OF LEARNING TIMES, PART I

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F
Between experimental and control	1	458.29	458.29	.15
Within groups	55	163369.22	2970.35	
Total	56	163827.51		

approach the 5 per cent level of significance. The null hypothesis was not rejected. The evidence indicated that for Part I of the program, no significant decrease in the time required to complete the program sequences was achieved through the use of the gated program.

The mean number of minutes required for completion of Part I was 149.8 for the experimental group and 155.5 for the control group, a difference of 5.7 minutes. A frequency distribution (Table VIII) showed the number of minutes required to complete Part I by the students in the experimental group (A) and students in the control group (B).

TABLE VIII

DISTRIBUTION OF MINUTES REQUIRED TO COMPLETE PART I

Minutes	Frequency Group A N = 29	Frequency Group B N = 28
50 - 99	3	6
100 - 149	15	5
150 - 199	7	11
200 - 249	1	5
250 - 299	3	1

One student in Group A completed Part I in fifty minutes while another student in the same group required the longest time to complete this part, 288 minutes.

The time required to complete Part II was substantially longer. An analysis of the times (Table IX) resulted in an F value of 1.22 which was not significant at the 5 per cent level. Therefore, the null hypothesis was not rejected. The evidence is insufficient to indicate that the gated form of the program, Part II, permits more efficient use of time than the ungated form.

TABLE IX

ANALYSIS OF VARIANCE OF LEARNING TIMES, PART II

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F
Between experimental and control	1	36363.55	36363.55	1.22
Within groups	55	1076610.67	19574.74	
Total	56	1112974.22		

The mean number of minutes required for students in Group A to complete Part II was 362.65; for students in Group B, the mean number of minutes was 413.18. A frequency distribution (Table X) showed the number of minutes required by students in each group to complete Part II. Two students in Group A required less than 150 minutes--the shortest time; and the longest times, 818 minutes and 823 minutes, were required by two students in Group B. Twenty students or 68.9 per cent of Group A completed Part II in less than 400 minutes whereas only sixteen students or 57.1 per cent of Group B finished within this time. A comparison of the group means indicated the students in the experimental group required 50.5 minutes less than those in the control group.

Since Part III involved the entire process of constructing a blouse, the time required to complete it doubled the time required to complete Part II. An analysis of the

TABLE X

DISTRIBUTION OF MINUTES REQUIRED TO COMPLETE PART II

Minutes	Frequency Group A N = 29	Frequency Group B N = 28
100 - 149	2	0
150 - 199	1	0
200 - 249	3	0
250 - 299	3	7
300 - 349	5	3
350 - 399	6	6
400 - 449	4	4
450 - 499	1	3
500 - 549	0	3
550 - 599	1	0
600 - 649	2	0
650 - 699	1	0
700 - 749	0	0
750 - 799	0	0
800 - 850	0	2

times (Table XI) required resulted in an F value of 3.19 which is not significant, thus indicating again that the

TABLE XI

ANALYSIS OF VARIANCE OF LEARNING TIMES, PART III

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F
Between experimental and control	1	116259.54	116259.54	3.19
Within groups	55	2002807.36	36414.68	
Total	56	2119066.90		

gated program was not superior to the ungated program with respect to the amount of time required to complete the program.

The mean number of minutes required to complete Part III was 703.48 for the experimental group and 793.82 minutes for the control group. A frequency distribution (Table XII) shows the number of minutes required by students in each group

TABLE XII

DISTRIBUTION OF MINUTES REQUIRED TO COMPLETE PART III

Minutes	Frequency Group A N = 29	Frequency Group B N = 28
400 - 499	2	0
500 - 599	4	6
600 - 699	10	5
700 - 799	6	5
800 - 899	2	3
900 - 999	2	3
1000 - 1099	1	1
1100 - 1199	1	3
1200 - 1299	0	1

to complete Part III. Two students in Group A completed this part in 450 minutes. The longest time required to complete it was 1265 minutes--this by a student in Group B. Twenty-two students or 76.8 per cent of Group A required less than 800 minutes whereas only sixteen students or 57.1 per cent of Group B completed the third part within this time.

When the times required to complete Parts I, II, and III inclusive were totaled, the findings were essentially the same.

Table XIII shows the distribution of minutes required to complete all three parts of the program. The mean number of minutes required by the experimental group to complete the program was 1215.97; for the control group, the mean was

TABLE XIII

DISTRIBUTION OF MINUTES REQUIRED TO COMPLETE THE PROGRAM

Minutes	Frequency Group A N = 29	Frequency Group B N = 28
600 - 799	2	0
800 - 999	3	5
1000 - 1199	14	4
1200 - 1399	5	1
1400 - 1599	1	4
1600 - 1799	2	2
1800 - 1999	1	2
2000 - 2199	1	1
2200 - 2299	0	1

1362.5. This indicated that the experimental group required an average of 146.53 minutes less than the control group to complete the program. Ten students or 35.7 per cent of Group B took longer than 1400 minutes to complete the program while only five students or 17.2 per cent of Group A required more than 1400 minutes. The shortest time was required by two students in Group A who completed the entire program in less than 800 minutes. No student in Group B finished within this time.

Though Group A required an average of 146.53 minutes

less than Group B, an analysis of the times (Table XIV) resulted in an F value of only 2.77 which is not significant at the 5 per cent level; the null hypothesis was not rejected. It

TABLE XIV

ANALYSIS OF VARIANCE OF TOTAL LEARNING TIMES

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F
Between experimental and control	1	305886.9	305886.9	2.77
Within groups	55	6065944.	110289.89	
Total	56	6371830.9		

can be said then, that statistically speaking, students using the gated form required just as much time to complete the program as did students using the ungated form.

Extent to which Students in Group A Used the By-Pass

The investigation of the extent to which students did not choose to by-pass when given the opportunity was of additional interest in the present study. It was believed that some students would respond to all frames in the program regardless of their need to do so. A frequency distribution (Table XV) indicated the average number and average percentage of students in the experimental group using the gates in each of the three program parts. Twenty-four gates were provided in Part I of the program, twenty-six in Part II, and twenty-five in Part III. The number of gates used in Part I ranged

from three to twenty-four. The number used in Part II ranged from four to twenty-five; in Part III, the range was four to twenty-five.

TABLE XV

DISTRIBUTION OF STUDENTS USING GATES IN PARTS I, II, III

Program Part	Number of Gates	Average Number Using Gates N = 29	Average Percentage Using Gates
I	24	24.2	84.5
II	26	23.1	79.8
III	25	23.6	81.7
Total	75	23.6	81.2

An average of 24.2 of the twenty-nine students used the gates in Part I consistently. For Parts II and III, the average number of students using the gates consistently was 23.1 and 23.6, respectively. The mean number of gates used was 19.9, 20.2, and 19.6 in Parts I, II, and III, respectively. Only one student consistently used less than 18 per cent of the gates in each of the three program parts. The number and percentage of students using each of the seventy-five gates are shown in Appendix F.

The total number of gates in the program was seventy-five. An average of 81.2 per cent of these was used by the students. The data suggest that students would by-pass parts of the program when they were given the opportunity to do so.

The gate frames were divided into student-controlled gates and teacher-controlled gates as described in Chapter III. It was hypothesized that sections of the program under student control would be by-passed more frequently than sections under teacher control. This would seem to indicate that students would by-pass more frequently than the teacher thought they should. When the number of gates was analyzed in this respect, it was found that 90.7 per cent of the student-controlled gates was used by students in Group A and only 75.5 per cent of the teacher-controlled gates was used. Thus, the evidence seemed to support the hypothesis.

Desirability of By-Passing Relative to Student Mastery

The desirability of by-passing relative to mastery by the students of program objectives was also explored in this study. It was believed that a student should not by-pass a section of the program unless he knew the information in that section. If a student by-passed the section without demonstrating adequate mastery of the material, he was considered to be using poor judgment in the decision to by-pass. To secure empirical evidence of student judgment in the decision to use the by-pass, the gate frames were matched with specific items on the various criterion tests--the items chosen were those which measured the same mastery of learning measured by the criterion on a specific gate frame in a section of the program. Correlated test items were found for fifty-one of the

gate frames. A listing of the gate frames and associated test items, including the number of students passing and failing each of the test items, is found in Appendix F.

If a student failed the criterion test item corresponding to the gate frame, it was assumed that he did not know the material, and therefore, should not have by-passed the section. The fifty-seven students were divided into three sections to summarize the relative efficiency of student judgment. Section 1 included those students in the experimental group who used the gates; Section 2 included students in the experimental group who did not use the gates; and Section 3 included all the students in the control group--these students had no opportunity to use the gates.

The three sections were compared with respect to success or failure on the test items (see Table XVI). The mean number of errors for each section was calculated. For Section 1, the mean number of errors was 4.04 and, for Section 3,

TABLE XVI

MEAN ERRORS ON CRITERION TEST ITEMS OF STUDENTS GROUPED ACCORDING TO USE OF GATES

Section*	Mean Test Errors
1	4.04
2	0.78
3	2.86

* Section 1--students in Group A who used the gates
Section 2--students in Group A who did not use gates
Section 3--students in Group B

the mean number of errors was 2.86. The fewest number of errors was made by students in Section 2; these students had been given an opportunity to use the gates but did not use them. It was concluded that students in the experimental group were not consistent in using good judgment in by-passing sections of the program since more errors were made by students who used the gates than by any other group.

Summary of Student Reaction to Programmed Teaching

The reaction of each student to the clothing program, to programming in general as an instructional method, and to the by-pass system was indicated on the three-page form, Student Reaction to Programmed Teaching (see Appendix B). Five categories used to indicate varying degrees of reaction were "agree very much," "agree," "uncertain," "disagree," and "disagree very much." Columns one and two were combined and columns four and five were combined in order to summarize the data for this study.

Responses of the fifty-seven students to the thirty items on the student reaction form are shown in Appendix G and in Figure 1. It should be noted that for some of these items, "disagree very much" and "disagree" represented a favorable reaction toward programmed teaching because of the way in which the statements were worded. These statements have been rephrased to form positive statements for inclusion in Figure 1.

Items 1-25 measured the student's reaction to programming in general and items 26-30 measured the student's preference for or reaction to the gated form of the program. The responses of the students in Groups A and B are indicated in Figure I. The statements of attitude and student responses are presented in order of favorableness toward programmed teaching. Items were arranged in order of the number of students who checked in Columns 1 and 3 indicating they agreed or disagreed with the statement. The middle third of the thirty items has been omitted so that Figure I shows only those items and student responses which show the most favorable and least favorable attitudes.

Student reaction toward programmed teaching in the two groups was generally not very favorable. Reaction to twelve of the thirty items was in the direction of an unfavorable attitude toward programmed instruction. Favorable attitudes were indicated by student responses to more than half of the items in the Student Reaction Form. The strongest reactions, favorable to programmed instruction, occurred in response to items 10, 27, 11, and 13 (see Appendix G and Figure I). In the case of these items, more responses occurred in the first column of positively stated items or in the third column of negatively stated items.

Almost 90 per cent of the students agreed with item 10 that programmed teaching is good because the student is shown immediately if an answer is right or wrong. More than three-fourths of the students agreed that programmed teaching is

Item	Statements of Attitude	Percentage of Responses
10.	P t...good way to learn... student shown...if right or wrong**	89.5
27.	By-passing...makes less boring if already know information.	84.2 / 15.8
11.	P t...good...steps placed in logical order.	78.9
13.	P t...good because learn while doing.	73.7
1.	P t...good way to learn... move as rapid or slowly as wish.	66.7 / 17.5
25.	P t...better if could help each other.	64.9 / 14.0
29.	Liked working by myself without interruptions.	63.1 / 10.5
21.	Liked being able to skip sections of the program.	59.7 / 22.8
22.	Liked teacher checking work... gave feeling of accomplishment.	57.9 / 26.3
23.	Program good when teacher has to check frames.	57.9 / 21.1
***	- - -	---
26.	It is fair for part of class to skip and rest...do all frames.	22.8 / 43.9
15.	Could not have learned more from teacher demonstrations.	22.8 / 56.1
8.	P t...not boring because facts are repeated many times.	21.1 / 54.4
17.	Would like part of courses programmed.	19.3 / 56.1
4.	P t...more interesting than other methods of teaching.	12.3 / 73.7
20.	More worked with programmed materials better I liked them.	70.2
7.	Teachers cannot teach better than a program can teach.	66.7
3.	P t...better way than other methods of teaching.	68.4
16.	Would like all of high school courses programmed.	87.7
24.	P t bad when...not enough equipment for each person.	98.3

Agree Uncertain Disagree

*The items are arranged in order of favorable reaction to programmed teaching.
**Items in this table are abbreviated.
***The middle third of the items are omitted.

Figure 1. STUDENT REACTION TO PROGRAMMED TEACHING*

good because "you learn while you are doing something," item 13.

Student responses to items 1, 25, 21, 22, and 12 indicated that only slightly more than half of the group was favorable to programmed instruction in general. Sixty-seven per cent agreed with item 1 that programmed teaching is a good way to learn because the students can move as rapidly or slowly as they wish. Student responses to item 25 indicated favorableness toward programmed instruction but felt it would be better if "you could help each other instead of doing it all by yourself."

Approximately an equal number of students agreed with items 21 and 22 which required the students to appraise the format of the program. Sixty per cent liked having the teacher appraise their work and 58 per cent liked "working by myself without interruptions."

Fifty-six per cent of the students agreed that programmed teaching is effective because the student learns a small amount at a time, item 12, and almost half thought that programmed teaching is better than other methods of teaching because the important things are learned step-by-step.

Items 3 and 4 required that the students compare programmed teaching with other methods of teaching. More than two-thirds agreed that programmed instruction was neither a better method of learning (item 3) nor more interesting than

other methods (item 4). This attitude was further supported when 67 per cent of the students agreed that teachers can teach better than a program can teach, item 7.

Items 26, 27, 28, 29, and 30 represented the preference of the students for the gated or ungated form of the program. Students generally preferred the gated program to the ungated program. Eighty-four per cent agreed that by-passing parts of the program makes it less boring for those who already know the information, item 27; 63 per cent agreed that they liked being able to skip sections of the program, item 29.

Student responses to items 28 and 30 indicated some uncertainty about the format of the gated program. Only 47 per cent "liked being able to decide for myself whether to skip a section" while 42 per cent indicated it made them feel bad to go back to do a section when they answered incorrectly.

Responses to item 24 indicated the student's reaction to the crowded conditions under which the study was conducted. An overwhelming majority, 98 per cent of the subjects, agreed that programmed teaching is bad when there is not enough equipment for each person.

When the experimental and control groups were compared with respect to attitude toward programmed instruction in general, no significant difference between the two groups was found. The comparisons of the responses between the experimental and control groups for each of the thirty statements of attitude are shown in Appendix G.

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CHAPTER V

SUMMARY AND RECOMMENDATIONS

Summary

The purposes of this study were to initiate a by-pass system into a self-instructional clothing program developed as a part of the U. S. Office of Education Cooperative Research Project No. 5-1042 and to appraise the gated program using a field test as a source of data. The study was also designed to gain information about the relative effectiveness of the by-passing technique in general, and to secure empirical evidence of the relative efficiency of student judgment in the use of the gated program. The gated program was prepared following an extensive review of other by-pass methods and a thorough study of the program objectives and corresponding sections of frames. The by-pass system as incorporated in the clothing program was used to provide a short route through the program.

A parallel by-pass form with a single loop was selected to provide the short route through the linear clothing program. The format essentially consisted of two paths through the program. Path 1 provided a short-cut through the programmed material; path 2 required that the student react to all frames in the proper sequence. The short track was achieved through

the use of gate frames which allowed the experienced student to by-pass sections of frames in which he already knew the information.

The three-part self-instructional clothing program consisted of 789 frames and included seventy-five gate frames. Of the gate frames, fifty-two were designated student-controlled gates and twenty-three were teacher-controlled. Instructions for using the short track through the program were given in the left margin of a supplementary answer booklet.

The following supplementary materials were selected and revised to accompany the program for field testing: (a) an answer booklet for the ungated program which contained answer blanks corresponding to the frames in the program, (b) an answer booklet for the gated program which followed the same format but also included instructions for using the short track, (c) a time-and-error record form, (d) a student experience questionnaire, and (e) a student reaction form. Also accompanying the program was a set of panels and exhibits which assisted in the clarification of program concepts.

Students in two junior high school classes in Greensboro, North Carolina, were selected as subjects for the study. The fifty-seven female students were members of first-year home economics classes. These students were randomly assigned to one of two experimental conditions: (A) using the clothing program with an opportunity to by-pass and (B) using the same

program with no opportunity to by-pass.

The regular classroom teacher with occasional assistance from the researcher administered the program to both groups. An experience questionnaire which determined the student's degree of previous experience and a pre-test were administered to the subjects on the day preceding the initiation of the program. The students proceeded through the programmed materials for six consecutive school weeks and kept daily time records; a blouse was constructed by each student as an integral part of the program learnings. At the conclusion of the six-week period, each student was given a series of criterion tests and was asked to respond to the Student Reaction Form. The blouses were taken to The University for scoring by trained judges. Five weeks following the completion of the field test proper, students in the experimental and control groups were given an unannounced criterion test to measure retention of program learnings.

The findings of the field test indicated no significant difference between the experimental and control groups with respect to each of the following variables related directly to mastery of program objectives:

1. scores on a written post-test,
2. gain scores after completion of the program,
3. scores on the two-hour performance test,
4. workmanship scores on the blouse, and
5. scores on the delayed paper-and-pencil test.

The researcher concluded that use of a by-passing program apparently does not interfere with a student's achievement of program objectives. In general, it appears that a by-passing program is as effective in providing for student learning as a non by-passing program.

It was hypothesized that students using a gated form of the clothing program would complete the programmed sequences in less time than students using an ungated form. When the field test data were analyzed, no significant difference was found between the experimental and control groups with respect to time required to complete the program. The mean time required to complete all three program parts was 20.3 hours for the experimental group and 22.5 hours for the control group. It was concluded that use of a program with a by-pass system does not permit more efficient use of time than use of a program without a by-pass provision.

The investigation of the extent to which students did not choose to by-pass when given the opportunity was of additional interest to the present study. It was believed that some students would respond to all frames in the program regardless of their need to do so. When the number of gates used by students in the experimental group was averaged, it was found that students used 81.2 per cent of the gates consistently. Thus, the evidence seemed to indicate that students will skip sections of a program if they are given the opportunity to do so.

When use of specific gates was compared to failure of associated criterion test items, it was found that the students who used the gates had a mean of 4.04 errors on fifty-one items. Students in the control group who were given no opportunity to by-pass had a mean error rate of 2.86 on the same items. This seemed to indicate that students were unable to use good judgment consistently in making the decision to by-pass.

Reactions to programmed teaching and the self-instructional clothing program were generally unfavorable in both groups. Reaction to twelve of the thirty items on the Student Reaction Form was in the direction of an unfavorable attitude toward programmed instruction. It is the researcher's belief that the crowded conditions under which the program was administered and the very nature of the field test which permitted part of the students to skip major sections of the program resulted in the generally unfavorable attitudes toward programmed teaching. Students in the experimental group who used the gated program were generally more favorable to programmed instruction on some points than those in the control group. This seemed to indicate that the by-pass format may decrease the monotony of strictly linear programming for students having a high degree of previous experience with the subject matter being programmed.

Although use of the short track did not interfere with student achievement of program objectives, it neither

decreased the amount of time required to complete the program nor resulted in more favorable attitudes toward programming than use of a nongated program. In other words, the by-passing technique developed in this study was not an effective means of adjusting a program to initial individual differences. The researcher concluded that the by-pass format selected for use in this study should not be initiated into the self-instructional clothing program since no significant advantages were indicated in the field test.

Recommendations

Revising the Self-Instructional Clothing Program

The following revisions or suggestions are recommended for further improvement of the clothing program:

1. Rewrite sections of the program Part I to make it useable on all models of sewing machines.
2. Write sections of frames about
   a. opening and closing the machine
   b. storing and installing the electrical cord.
   c. using the buttonhole attachment
   d. zipper application
   e. hand hemming
3. Improve or clarify the method of testing tensions.
4. Reorganize program sections so that pattern selection, understanding instructions on the pattern envelope, preparation of fabric, and cutting are included prior to Part I, The Sewing Machine.

5. Reword frames requiring the use of fabric samples so that students use their own fabric scraps.
6. Number frames and sections of the program consecutively.
7. Delete all reference to a blouse so that other simple garments can be made using the program.

Classroom Administration of the Clothing Program

The following recommendations are made for use in the classroom administration of the program:

1. Prepare a stencil for use in preparing answer booklets for individual students.
2. Use student assistants to aid in the appraisal and reinforcement of frames.
3. Have enrichment activities planned for students who finish first.
4. Develop a system by which slower students can take program parts home for additional work.
5. Use selected sections of program as a review for II and III year students.

Revising the By-Pass System in the Clothing Program

Revisions in the by-pass system recommended by the researcher are:

1. Divide the program into larger sections of information which can be by-passed.

2. Include the criterion frame prior to the section which is to be by-passed.
3. Include instructions for using the by-pass in the sequences of the program itself.
4. Provide adequate controls to assure that students by-pass only when they have demonstrated mastery of the learnings in the section.
5. Construct gate items that can discriminate between those who know the criterion skills and behaviors and those who do not.

LIST OF REFERENCES

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1. BRIGGS, LESLIE J., PLASHINSKI, D., and JONES, D. L. Self-Pacing Versus Automatic Pacing of Practice on the Subject-Matter Trainer. Unpublished Laboratory Note AFPTRC, ASPRL-LN-55-8. Lowry Air Force Base, Colorado: Armament Systems Personnel Research Laboratory. September, 1955. (Mimeo.)

2. CAMPBELL, VINCENT N. Adjusting Self-Instructional Programs to Individual Differences: Studies of Cueing, Responding and Bypassing. AIR-c41-7/61-SR. San Mateo, California: American Institute for Research. July, 1961. 38 pp. (Mimeo.)

3. COULSON, JOHN E., and others. Effects of Branching in a Computer-Controlled Auto-Instructional Device. Technical Memorandum 617. Santa Monica, California: System Development Corporation. May, 1961. 8 pp. (Mimeo.)

4. COULSON, JOHN E., and SILBERMAN, HARRY F. "Effects of Three Variables in a Teaching Machine." Journal of Education. 51: 135-143; June, 1960.

5. CROWDER, NORMAN A. "Automatic Tutoring by Means of Intrinsic Programming." Automatic Tutoring: The State of the Art. Edited by Eugene Galanter. New York: John Wiley and Sons, Inc., 1959. pp. 109-116.

6. CROWDER, NORMAN A. "On the Differences Between Linear and Intrinsic Programming." Educational Technology. Edited by John P. DeCecco. New York: Holt, Rinehart and Winston, Inc., 1964. pp. 142-152.

7. CROWDER, NORMAN A. "Simple Ways to Use the Student Response for Program Control." New York: Educational Science Division U. S. Industries, Inc. (350 Park Avenue), 1961. 12 pp. (Offset)

8. DECECCO, JOHN P. (ed.) "Individual Differences: Achievement Versus General Ability." Educational Technology. New York: Holt, Rinehart and Winston, Inc., 1964. pp. 345-348.

9. LUMSDAINE, ARTHUR A. "Some Differences in Approach to the Programming of Instruction." Programmed Learning Evolving Principles and Industrial Applications. Edited by Jerome P. Lysaught. Ann Arbor: The Foundation for Research on Human Behavior, 1961. pp. 37-52.

10. LYSAUGHT, JEROME P. and WILLIAMS, CLARENCE M. A Guide to Programmed Instruction. New York: John Wiley and Sons, Inc., 1963. 180 pp.

11. MAGER, ROBERT F. "Preliminary Studies in Automated Teaching." IRE Transactions on Education. E-2: 104-107; June, 1959.

12. MARKLE, SUSAN M., EIGEN, LEWIS D., and KOMOSKI, P. KENNETH. A Programmed Primer on Programming. New York: The Center for Programmed Instruction (365 West End Avenue), 1961. 25 pp.

13. MOORE, CATHERINE PORTER. "Development of a Self-Instructional Program on the Sewing Machine." Unpublished Master's Thesis. Greensboro: The Woman's College of the University of North Carolina. 1963.

14. ROE, ARNOLD. "A Comparison of Branching Methods for Programmed Learning." Journal of Educational Research. 55: 407-416; June-July, 1962.

15. SCHRAMM, WILBUR. Four Case Studies of Programmed Instruction. New York: The Fund for Advancement of Education, Ford Foundation, 1964. 119 pp.

16. SCHRAMM, WILBUR. Programmed Instruction Today and Tommorrow. New York: The Fund for Advancement of Education, Ford Foundation, 1962. 74 pp.

17. SHETTEL, HARRIS H. Individual Differences in Subject Matter Knowledge and Programmed Instructional Format. San Mateo, California: Training and Education Program of the American Institute for Research. 1963. 23 pp.

18. SILBERMAN, HARRY F. and others. "Fixed Sequence vs. Branching Auto-Instructional Methods." Journal of Educational Psychology 52: 166-172; June, 1961.

19. SILVERMAN, ROBERT E., and ALTER, MILLICENT. Response Mode, Pacing and Motivational Experiments in Teaching Machines. Technical Report NAVTRADEVCEN 507-2. Port Washington, New York: U. S. Naval Training Device Center, June, 1961. 69 pp. (Offset)

20. SHOFFNER, SARAH MOORE. "Revision and Field Test of a Self-Instructional Program on the Sewing Machine." Unpublished Master's Thesis. Greensboro: The University of North Carolina at Greensboro, 1964.

21. SKINNER, B. F. "Teaching Machines." Teaching Machines and Programmed Learning: A Source Book, ed. by A. A. Lumsdaine and Robert Glaser. Washington, D. C.: National Education Association Department of Audio-Visual Instruction, 1960. pp. 137-158.

22. WENDT, PAUL R. Audio-Visual Instruction. Washington, D. C.: National Education Association Department of Classroom Teachers, American Education Research Association, 1966. p. 29.

APPENDIXES

APPENDIX A

EXAMPLE OF BY-PASSING THROUGH USE OF THE GATES

EXAMPLE OF THE BY-PASS SYSTEM

These are sample frames from Part II, The Pattern program, Section 5. The instructions for by-passing are given in a supplementary answer booklet.

BY-PASS INSTRUCTIONS
2. Skip to frame 5. If you chose the wrong pieces, begin with frame 1 and work through frame 5.

1

Included in every pattern envelope is a pattern guide sheet which gives directions for cutting and constructing a garment.
PANEL 25 is a * _____.

2

Refer to Panel 25, FIGURE I.

In the upper left corner of this pattern guide sheet above the cutting layouts, the pattern pieces needed for a particular view are shown.

For View 1 pattern pieces A, B, and C will be used.

For View 2 what three pattern pieces would you use?

_____, _____, and _____.

3

In Panel 25, FIGURE I, would pattern piece D be used for making a skirt like View 3?

_____yes _____no

4

Use Panel 25, FIGURE II.

Which pattern pieces would you need for making View 3?
*_____.

5

Refer to your guide sheet. Which pattern pieces will be used to make your blouse, View 1? *_____
_____.

APPENDIX B

DESCRIPTIONS AND EXAMPLES OF SUPPLEMENTARY MATERIALS AS USED IN THE PRESENT STUDY

1. Experience Questionnaire
2. Pre-test and Post-test
3. Two-hour Performance Test
4. Time-and-Error Record
5. Student Reaction Form

NAME_____ DATE_____

SCHOOL_____

SEWING EXPERIENCE

	YES	NO
1. Have you ever used a sewing machine?.....		
2. Do you have a sewing machine in your home?		
3. Did you use a sewing machine in a Junior High School home economics class, in 4-H club work, in Girl Scouts, or in projects in any other club?.....		
4. Did your mother teach you how to use a sewing machine?.....		

5. Which of these garments have you made? Write the number of garments made in the appropriate column.

Garments	with help	without help
Apron.....		
Sleeveless blouse.....		
Blouse with sleeves.....		
Gathered skirt.....		
Fitted skirt.....		
Shift or jumper.....		
Dress with waistline seam..		
Two-piece outfit..... (skirt and jacket or top)		
Shorts or slacks.....		
Other: _____		
_____		
_____		

Description of Pre-Test and Post-Test

Eighty-eight multiple-choice items were included in the Pre-test. The same items were used in the Post-test but were arranged in a different order. Approximately one-fourth of the items included a diagram. This criterion test included items measuring the student's ability to recall, understand, and apply the major program learnings.

Answers were recorded on a separate IBM answer sheet. A sample page from the test is found on the following page.

CLOTHING CONSTRUCTION TEST I

Your answers for this test are to be recorded on the IBM answer sheet. Find the number on the IBM answer sheet which is the same as the number of the question on the test. Select ONE response for each item and fill in the "response space" for the answer you select with a solid black pencil mark.

Be sure your mark does not go beyond the "response space" for the answer you have chosen. If you make a mistake and mark the wrong space, erase the mark completely before marking the correct space.

Example: 1. The capital city of the United States is

1. New York
2. Washington, D. C.
3. Los Angeles

1. 1 = = = = 2 ▬▬▬▬ 3 = = = = 4 = = = = 5 = = = =

Number 2 is the correct answer so that "space" has been filled in.

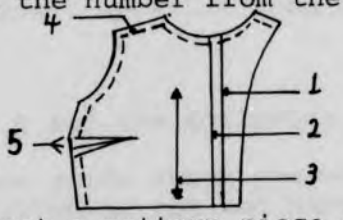
1. Susie wants to buy a blouse pattern. She should

1. buy the same size as her friend who is the same age she is.
2. buy the same size she buys in a ready-made blouse.
3. buy the size indicated by her body measurements.

2. When taking a bust measurement, the tape measure should be placed

1. above the fullest part of the bust.
2. over the fullest part of the bust.
3. below the fullest part of the bust.

For each of items 3-6 select the number from the diagram which corresponds to the terms.



3. grainline
4. facing fold line
5. dart lines
6. center front

7. To determine whether or not a pattern piece is placed on the fabric straight with the grain, one should measure to see if the distance is the same from

1. both ends of the grainline arrow to the center front line.
2. both ends of the grainline arrow to the selvage edge.
3. the edges of the pattern piece to the selvage edge.

8. Cutting layout diagrams do not show how pattern pieces are arranged

1. for steps in construction.
2. on different widths of fabric.
3. on the fabric for different sizes.

APPLICATION PERFORMANCE TEST

DAY I

The construction processes you will be asked to do in this test are similar to the things you might be doing if you sew at home. You will not have a garment by the time you complete the steps below--in fact, the end product is going to look rather strange.

When you read some of the directions below, you may think you do not know how to do them because on your blouse you did not do some of the steps described. Don't let this discourage you. Go ahead and do whatever you think might be right--try to figure out a way to do it. If you can't, do not worry about it. Go on to the next item.

Read the directions carefully. Your score will be influenced by how well you follow the directions. Do each step as accurately and as rapidly as possible. If you have to wait for the teacher, study the next steps. At each big round dot, ●, raise your hand to call the teacher. She will want to watch you during that step.

A. You have been given a piece of fabric with a pattern piece pinned to it.

   1. Cut out the pattern piece.

   2. Use a tracing wheel and carbon paper to trace all necessary markings.

   3. Using the pattern for the blouse front, cut a facing 2½" wide for the front neckline from the fabric you were given.

B. Use materials labeled B for the following procedures:

   1. Refer to the blouse guide sheet you were given. Follow the directions circled in red and make a collar.

   2. Use materials labeled B 2 to do the following procedures:

      a. Stitch the dart marked on the square of fabric.

      ● b. Staystitch the necessary edges of the blouse front and draw arrows indicating the direction in which you stitched.

APPLICATION PERFORMANCE TEST

DAY II

The construction processes you will be asked to do in this test are similar to the things you might be doing if you sew at home. You will not have a garment by the time you complete the steps below--in fact, the end product is going to look rather strange.

When you read some of the directions below, you may think you do not know how to do them because on your blouse you did not do some of the steps described. Don't let this discourage you. Go ahead and do whatever you think might be right--try to figure out a way to do it. If you can't do not worry about it. Go on to the next item.

Read the directions carefully. Your score will be influenced by how well you follow the directions. Do each step as accurately and as rapidly as possible. If you have to wait for the teacher, study the next steps. At each big round dot, ●, raise your hand to call the teacher. She will want to watch you during that step.

C. You have been given a skirt pattern and some fabric.

1. Select the cutting layout diagram for View 1 that is correct for the pattern and the fabric you were given. Please place pencil check mark by the layout you chose.

2. Following the cutting layout you chose, pin the skirt front, skirt back and waistband pieces to the piece of fabric.

3. Use materials labeled C 3; ● pinbaste the left shoulder seam.

D. Take the blouse front and back you have just pinbasted to the machine and:

1. Stitch the shoulder seam.

2. a. Select the armhole facing for the left armhole. Bridgestitch and cleanfinish the outer edge of the facing. Pinbaste and stitch it to the left armhole.

   b. Do all that is necessary to complete the armhole facing.

OBSERVER PERFORMANCE TEST

Transfer items - T
Crucial items - *

Place a "1" in the space when the student responded or performed correctly and an "0" when she responded or performed incorrectly.

A. 1. Show student a machine which is different from the one on which she worked and ask student to locate the following parts.

T
_____1. thread take-up
_____2. spool pin
_____3. three thread guides
_____4. tension regulator
_____5. wire spring on tension regulator
_____6. thread guide on tension regulator
_____7. bobbin winder
_____8. stop-motion screw

2. Ask student to thread the upper parts of a machine through the needle which is different from the one on which she worked.

_____9. first thread guide threaded

tension regulator

T
_____10. thread between discs
_____11. thread in wire spring
_____12. thread in thread guides on or near tension
* _____13. tension regulator threaded before thread take-up
* _____14. thread take-up threaded

needle

_____15. thread guides threaded
_____16. threaded from side of last thread guide

B. Folding Fabric

T
_____17. folded fabric lengthwise
_____18. folded fabric crosswise

C. Pattern Layout

_____19. fabric straight with the grain
_____20. fold in fabric even in width

T

_____21. correct cutting layout selected
_____22. fabric folded as cutting layout suggested

Pattern pieces placed exactly as recommended on cutting layout

_____23. skirt back
_____24. skirt front
_____25. waistband

Pattern pieces placed on grain (within 1/16"--measure from nearest selvage edge)

_____26. skirt back
_____27. waist band

Skirt Front

_____28. pattern fold line placed on fold (within 1/16")
* _____29. skirt front placed on fold

D. Cutting and Marking

_____30. notches cut outward

All necessary positions marked on bodice front

T

_____31. underarm dart
_____32. waistline dart
_____33. nechline seamline
_____34. armhole seamline
_____35. dot on armhole seamline
_____36. no unnecessary positions marked

..... Facing

_____74. facing cut same shape as neckline
_____75. facing cut same shape as neckline and 2 1/2" wide
_____76. facing cut off at shoulder line
_____77. facing cut on grain

TIME RECORD

NAME_____

Date	Frame Beginning Number	Last Frame Number	Total Frames	Number of Errors	Beginning Time	Ending Time	Total Time

STUDENT REACTION
TO
PROGRAMMED TEACHING

NAME_____
DATE_____
SCHOOL_____
AGE_____ GRADE IN SCHOOL_____

INSTRUCTIONS: The method by which you learned how to use the sewing machine and to sew is programmed teaching. Now that you have finished the program, how do you feel about this kind of learning? The following statements are being used to determine your opinion of this new method of teaching. There are no right or wrong answers; think only of your personal opinion of each statement. Your answers will in no way affect your grade in this course.

NOTE: 1. Please read each statement carefully.
2. Place a check ( ) in the space to the left of each statement which best explains how you feel about that statement. If you agree very much with statement 1, place a check in the space under agree very much beside statement 1.

AVM*	A	U	D	DVM

*AVM--Agree Very Much
A--Agree
U--Uncertain
D--Disagree
DVM--Disagree Very Much

1. Programmed teaching is a good way to learn because students can move as rapidly or as slowly as they wish.

2. Programmed teaching is good because some students are not left behind other students in the class.

3. Programmed teaching is a better way to learn than other methods of teaching.

4. Programmed teaching is more interesting than other methods of teaching.

5. Programmed teaching is interesting because it is new.

6. Programmed teaching is a boring way to learn.

7. Teachers can teach better than a program can teach.

8. Programmed teaching is boring because the facts are repeated too many times.

9. Programmed teaching is better than other methods of teaching because the important things are learned step by step.

10. Programmed teaching is good because the student is shown immediately if an answer is right or wrong.

11. Programmed teaching is good because the steps are placed in logical order.

12. Programmed teaching is effective because the student learns a small amount at a time.

AVM	A	U	D	DVM

13. Programmed teaching is good because you learn while you are doing something--it is not just reading or listening.

14. Programmed teaching would be better used as homework than in the classroom.

15. I believe I could have learned more about the sewing machine from teacher demonstrations.

16. I would like to have <u>all</u> my high school courses programmed.

17. I would like to have <u>part</u> of my courses programmed.

18. I would like to have <u>some</u> programmed materials used in a few of my courses.

19. I would like to learn another skill (how to do something) by this new method.

20. The more I worked with programmed materials, the better I liked them.

21. I liked having the teacher tell me whether some step had been completed correctly or incorrectly--it gave me a feeling of accomplishment.

22. I liked working by myself without interruptions.

23. The program would be better if the teacher did not have to check any of the frames.

24. Programmed teaching is bad when there is not enough equipment for each person.

25. Programmed teaching would be better if you could help each other instead of doing it all by yourself.

26. It is not fair for part of the class to skip when the remainder have to do every frame.

27. By-passing parts of the program makes it less boring for those who already know the information.

28. I liked being able to decide for myself whether to skip a section--it gave me a feeling of independence.

29. I liked being able to skip sections of the program.

30. It made me feel bad to go back to do a section when I answered incorrectly.

APPENDIX C

EXAMPLE OF INSTRUCTIONS FOR BY-PASSING IN THE ANSWER BOOKLET FOR PART I, THE SEWING MACHINE

DIRECTIONS FOR USING THE BY-PASS

Do not write in the Program Booklets.

Read the section "Directions to the Student," page 1-14, then read the rest of this page.

This program will not make sense if you skip around. However, you will have the chance to skip certain sections if you know the information in that section.

You will be instructed to turn to a certain frame, for example, frame 21. You must read frame 21 and answer it.

After writing your answer, look on the back of the frame to see if your answer is correct.

DO NOT ERASE your first answer.

If your answer is correct go to the next written question in the answer booklet.

If your answer is incorrect, the instructions in this answer booklet will tell you to turn back to the frames in the program booklet which will help you.

After working through the series of helping frames you will again answer the test frame.

Then return to this answer booklet and read the frame to which you are sent.

Instructions	Answers
1. Fill out the time record each day.	1. _____ _____
2. Work through frames 1-8.	2. _____ or ____
	3. _____
	4. _____ or _____
	5. _____
	6. _____
3. Skip to frame 11a.	11a._____
If incorrect do frames 9-11a.	11._____
	11a._____

4. Skip to frame 16b.

   If incorrect work through frames 12-16b.

16b._____

12. **_____

13. _____

16b. **_____

5. Skip to frame 20a.

   If incorrect return to frame 17 and work through 20z.

20a. **_____

18. _____

19. _____ the _____

20a. **_____

6. Complete frame 21.

21. _____ thread guide

_____ tension regulator

7. Skip to frame 24a.

   If the teacher finds any mistake, do frames 22-24a.

24a. _____

24a. _____

8. Follow instructions in frames 25 and 26.

25. _____

26. _____

9. Turn to frame 31.

31. _____

**_____

   If you have difficulty work frames 27-31.

28. _____

29. *_____

30. _____

31. _____

**_____

10. Skip to frame 33.

33. **_____

   If you have trouble refer to frame 32.

32. _____ the _____

* _____

33. **_____

11. Complete frames 34-36

34. _____

APPENDIX D

DESCRIPTION AND SAMPLE SHEET FROM THE BLOUSE EVALUATION DEVICE

DESCRIPTION OF BLOUSE EVALUATION DEVICE

The Blouse Evaluation Device was used to score the student's quality of workmanship on the blouse she constructed while using the self-instructional clothing program. The areas of workmanship evaluated included: (a) general appearance, (b) grainline of sleeve, (c) staystitching of neckline, (d) plain seams, (e) neckline facing, (f) darts, (g) the sleeve, (h) sleeve hem, and (i) blouse hem.

The device included 121 items, each having a range of scores from 0 to 3. For each of the 121 items, a description of the correct technique was given. If the garment being scored met this criteria, it was given a score of three for that item. The criteria for a score of two and one were likewise described for each of the items. The blouse was scored according to which criteria it met most successfully. If the technique was omitted, the blouse was given a zero for that item.

The blouses were scored by five college students trained in the use of the evaluation device. The scoring of the first twenty blouses was done by all five students and their total scores correlated to assure consistency in the use of the blouse evaluation device. A sample page from the evaluation device is shown on the following page.

72.	There are single traced straight lines for both shoulder darts	on one dart there is a double traced line or a traced line that is crooked	on both darts there are double traced lines or traced lines that are crooked	72.__
73.	For both shoulder darts a small crossline was traced to mark the end of the dart	crossline for one dart only	_____	73.__
74.	On shoulder darts stitching tapers evenly at the points so there are no puckers	pucker at the point of one shoulder dart	pucker at the point of both shoulder darts	74.__
75.	On shoulder darts stitching coincides with traced lines	stitching coincides with traced lines on one dart	stitching misses traced lines on both darts	75.__
76.	On shoulder darts stitching tapers correctly	stitching tapers correctly on one dart	stitching does not taper correctly on both darts	76.__
77.	Threads are hand tied securely at the points of shoulder darts	threads at the point of one dart are not tied or loosely tied	threads at the points of both darts are too loosely tied	77.__
78.	There are single traced straight lines for both underarm darts	on one dart there is a double traced line or a traced line that is crooked	on both darts there are double traced lines that are crooked	78.__
79.	For both underarm darts a crossline was traced to mark the end of the dart	crossline for one dart only	_____	79.__
80.	On underarm darts stitching tapers evenly at the points so there are no puckers	pucker at the point of one underarm dart	pucker at the point of both underarm darts	80.__
81.	On underarm darts stitching coincides with traced lines	stitching coincides with traced lines	stitching misses traced lines on both darts	81.__

APPENDIX E

INSTRUCTIONS TO THE STUDENTS

INSTRUCTIONS TO THE STUDENTS, TO BE GIVEN ORALLY

NOTE: Before reading these instructions to the student write the following on the chalkboard:

(1)

Date	Beginning Frame No.	Last Frame No.	Total Frames	No. of Errors	Beginning Time	Ending Time	Total Time
Feb.1	42	102	60	5	8:35	9:30	50 min.

(2)
- date
- frame number with which you begin and
- time you begin working

(3)
- last frame number completed
- total number of frames completed that day
- time you stopped working
- number of minutes spent on the program that day and
- number of errors made that day.

1. Your class has been chosen to participate in a research project sponsored by the U. S. Office of Education. Yours is one of twelve schools to take part in this study.

   The purpose of this project is to find out how well a new method of teaching works. All of you will not be doing the same things at the same time, so it is important that you do not discuss with one another what you are doing in class. We will appreciate it if you develop the attitude of a real scientist and not share what you're doing with anyone else.

   Since we will have information from sixty students in your school to keep track of, it will be easier for us to assign each of you a number. This number will be used on all the materials with which you will work. You'll get a number like 001, 007, etc. so if you want to you can pretend you are a class of secret agents trying out a new method of espionage.

2. We want to find out what students in first year home economics know about the sewing machine and sewing before they begin a sewing unit and some of the things you like to do. So we'll take the time right now for each of you to fill in the Student Information Questionnaire you have been given. (Give the students time to fill in the questionnaire. Collect the questionnaire for experience rating later).

3. As was mentioned earlier, you are co-operating in a research study on a new way to learn in which a new method of teaching will be used. Some of you may have already heard about this new method, which is known by several names: programmed instruction, programmed learning, self-instruction, and learning by teaching machines.

SHOW PROGRAM

4. You will use a programmed text and will learn how to use a sewing machine, how to use a commercial pattern, and how to make a blouse. There are three major parts to the program. When you have finished with Part I, you will be given Part II, and then Part III. The directions in the beginning of the program will tell you how to proceed through each part. Be sure to read the directions carefully.

PASS OUT ANSWER BOOKLETS

5. Since you will not be writing in the program booklets, each of you has been given an answer booklet with your name and number on it. You will also be given a set of program booklets with your number on them. Do not write in the program booklets. Return program booklets each day to the central storage area.

6. On most of the pages in the program booklet, you are asked to answer a question or complete some statement. This is not a test. The program teaches the correct answer. In the answer booklet each page of the program has a space in which you will write your answer.

7. A time record was included in the materials given out earlier. You will fill it out each day to let us know how much time you spend on the program, the number of errors you make, and the number of frames or pages you finish each day.

REFER TO THE CHALKBOARD--Explain each of the entries in the sample time record on the chalkboard and allow time for questions on the form.

8. Each day you will come in class and begin working without waiting for the whole class to start. Go to the machine or table to which you have been assigned, write down the beginning frame number, and the time you begin. Then start to work.

9. Remember that some people cannot work when others are talking so please work as quietly as possible.

10. Raise your hand and wait for the teacher if you have a question.

SPECIAL INSTRUCTIONS FOR THE GATED GROUP

You will be given a program which allows you to skip parts of the material if you demonstrate that you already know that material. The directions for skipping are included on the first page in your answer booklet. Please turn to that page now and we will go over the instructions together. (Go over the directions for by-passing step-by-step and allow sufficient time for student questions.

APPENDIX F

1. NUMBERS AND PERCENTAGES OF STUDENTS USING EACH OF THE SEVENTY-FIVE GATES

2. LOCATION OF TEST ITEMS ASSOCIATED WITH SPECIFIC GATE FRAMES

Includes Number of Students Passing and Failing Each of The Test Items

Part	Section	Gate Frame Number	Number Using Gate	Percentage Using Gate
1 I	1	11a	21	72.4
2		16b	24	82.8
3		20a	26	89.7
4		24a	24	82.8
5		31	23	79.3
6		33	20	68.9
7		42	16	55.2
8		46a	28	96.6
9		50	25	86.2
10		55	28	96.6
11		59	28	96.6
12		84	28	96.6
13		99a	26	89.7
14		106a	25	86.2
15		111a	25	86.2
16		113a & 114	19	65.5
17		125	27	93.1
18		131a	26	89.7
19		140	21	72.2
20		144	24	82.8
21		149	26	89.7
22		154	25	86.2
23		164 & 165	26	89.7
24		185	27	93.1
25 II	1	13	22	75.9
26		22	14	48.2
27		30a	26	89.7
28	2	5	24	82.8
29		11	25	86.2
30		17	25	86.2
31	3	12a	20	68.9
32		15	21	72.4
33		20	26	89.7
34		27	16	55.2
35	4	5	27	93.1
36		9	26	89.7
37		11	28	96.6
38		13	23	79.3
39		17	28	96.6
40		19	26	89.7
41		25	28	96.6
42	5	5	27	93.1
43		15	24	82.8
44		25	22	75.9
45	7	3	17	58.6
46		12	22	75.9
47		14	19	65.5
48		22	20	68.9
49		25	22	75.9
50		27	23	79.3

1. Numbers and Percentages of Students Using Each of the Seventy-five Gates

1. (continued)

Part	Section	Gate Frame Number	Number Using Gate	Percentage Using Gate
III				
51	1	3	21	72.4
52		19	20	68.9
53		42	22	75.9
54	3	3	26	89.7
55		7	26	89.7
56		15	26	89.7
57		25	24	82.8
58		31	24	82.8
59	4	3	24	82.8
60		11a	22	75.9
61		15	25	86.2
62	5	7a & 8	19	65.5
63		12	23	79.3
64		17	23	79.3
65	6	8	23	79.3
66		14	26	89.7
67		19	27	93.1
68		24a	26	89.7
69		36	25	86.2
70		45	21	72.4
71		51	25	86.2
72	7	4	23	79.3
73	(see 16)			
74	(see 23)			
75	(see 62)			

2. STUDENT PERFORMANCE ON TEST ITEMS ASSOCIATED WITH SPECIFIC GATE FRAMES

Gate	Location of Test Item			Success or Failure on Test Item Group 1*	Group 2	Group 3
1	Perf**	15	+	7	5	10
			o	14	3	18
2	Post***	11	+	23	4	26
			o	1	1	2
3	Post	12	+	25	3	28
			o	1	0	0
4	Perf.	10	+	23	5	28
			o	1	0	0
5	Perf.	13	+	20	6	24
			o	2	1	4
6	Post	14	+	18	8	26
			o	3	o	2
7	Perf.	16	+	12	9	19
			o	4	4	9
8	Perf.	15	+	12	0	10
			o	16	1	18
9	Post	7	+	24	4	28
			o	1	0	0
10	Post	21	+	27	1	28
			o	1	0	0
11	Post	7	+	27	1	28
			o	1	0	0
12	Post	9	+	22	1	18
			o	6	0	10
17	Post	12	+	17	8	19
			o	2	2	9

** Perf. - the two-hour performance test
*** Post - the 88 item written criterion test
+ Passed the test item
o Failed the test item
* Group 1 - Students in experimental group who used the gates
Group 2 - Students in experimental group who did not use gates
Group 3 - Students in control group who were not given the opportunity to gate

19	Post	4	+	20	9	24
			o	0	0	4
25	Post	24	+	22	7	28
			o	0	0	0
26	Post	42	+	17	9	28
			o	3	0	0
28	Post	52	+	24	5	28
			o	0	0	0
30	Post	50	+	25	2	25
			o	0	2	3
31	Post	44	+	17	9	27
			o	3	0	1
32	Post	44	+	19	7	27
			o	2	1	1
33	Post	49	+	17	3	24
			o	9	0	4
34	Post	49	+	9	11	24
			o	7	2	4
35	Perf.	28	+	23	2	24
			o	4	0	4
36	Perf.	29	+	26	2	28
			o	1	0	0
37	Post	25	+	27	1	23
			o	1	0	5
38	Post	29	+	21	6	24
			o	2	0	4
39	Post	35	+	27	1	26
			o	1	0	2
43	Perf.	21	+	22	5	25
			o	2	0	3
44	Perf.	17	+	22	7	28
			o	0	0	0
45	Post	37	+	15	12	27
			o	2	0	1
46	Post	37	+	20	7	27
			o	2	0	1

47	Perf.	33	+	15	7	24
			o	4	3	4
50	Perf.	41	+	23	6	28
			o	0	0	0
51	Post	58	+	18	6	23
			o	3	2	5
52	Post	56	+	8	5	17
			o	12	4	11
53	Perf.	56	+	22	7	27
			o	0	0	1
54	Post	59	+	26	3	28
			o	0	0	0
55	Post	60	+	25	3	26
			o	1	0	2
56	Perf.	45	+	22	3	21
			o	4	0	7
58	Post	62	+	18	4	25
			o	6	1	3
59	Post	65	+	15	6	23
			o	6	2	5
62	Post	78	+	7	8	20
			o	12	2	8
63	Perf.	61	+	22	5	25
			o	1	1	3
64	Post	77	+	16	5	23
			o	7	1	5
66	Post	85	+	19	5	26
			o	7	1	2
67	Perf.	66	+	17	3	26
			o	8	1	13
68	Perf.	64	+	12	2	6
			o	14	1	22
70	Post	87	+	10	6	20
			o	11	2	8
71	Perf.	67	+	17	3	14
			o	8	1	14
72	Post	69	+	19	5	25
			o	4	1	3

APPENDIX G

RESPONSES OF ALL STUDENTS TO STUDENT REACTION FORM

COMPARISON OF RESPONSES TO STUDENT REACTION FORM

BETWEEN EXPERIMENTAL AND CONTROL GROUPS

STUDENT REACTION TO PROGRAMMED TEACHING

Item No.	Statements of Attitude	Group*	Agree	Uncertain	Disagree
10.	Programmed teaching is a good way because the student is shown immediately if an answer is right or wrong.	1	89.7	3.5	6.9
		2	89.3	7.1	3.6
		T	89.5	5.3	5.3
27.	By-passing parts of the program makes it less boring for those who already know the information.	1	93.1	6.9	0.
		2	75.0	25.0	0.
		T	84.2	15.8	0
11.	Programmed teaching is good because the steps are placed in logical order.	1	75.9	17.2	6.9
		2	82.1	13.8	3.6
		T	79.0	15.8	5.3
13.	Programmed teaching is good because you learn while you are doing something--not just reading or listening.	1	75.9	0.	24.1
		2	71.4	7.1	21.4
		T	73.7	3.5	22.8
1.	Programmed teaching is a good way to learn because students can move as rapidly or as slowly as they wish.	1	58.6	17.2	24.1
		2	75.0	13.8	10.3
		T	66.7	15.8	17.5
25.	Programmed teaching would be better if you could help each other instead of doing it all by yourself.	1	72.4	13.8	13.8
		2	57.1	28.6	13.8
		T	64.9	21.1	14.0
29.	I liked being able to skip sections of the program.	1	89.7	0	10.3
		2	35.7	50.0	13.8
		T	63.2	24.6	12.3
21.	I liked having the teacher tell me whether some step had been completed correctly or incorrectly--it gave me a feeling of accomplishment.	1	58.6	10.3	31.0
		2.	60.7	25.0	13.8
		T	59.7	17.5	22.8

* Group 1 - The twenty-nine students in the experimental group
Group 2 - The twenty-eight students in the control group

Item No.	Statements of Attitude	Group	Agree	Uncertain	Disagree
22.	I like working by myself without interruptions.	1	55.2	17.2	27.6
		2	60.7	13.8	25.0
		T	57.9	15.8	26.3
23.	The program would be better if the teacher did not have to check any frames.	1	17.2	10.3	72.4
		2	25.0	32.1	42.9
		T	21.1	21.1	57.9
12.	Programmed teaching is effective because the student learns a small amount at a time.	1	48.3	13.8	37.9
		2	64.3	13.8	21.4
		T	56.1	14.0	29.8
18.	I would like to have some programmed materials used in a few of my courses.	1	48.3	13.8	37.9
		2	46.4	28.6	17.9
		T	49.1	22.8	29.1
28.	I liked being able to decide for myself whether to skip a section--it gave me a feeling of independence.	1	51.7	34.5	13.8
		2	42.9	53.6	3.6
		T	47.4	43.9	8.8
9.	Programmed teaching is better than other methods of teaching because the important things are learned step by step.	1	44.8	34.5	20.7
		2	50.0	25.0	21.4
		T	47.4	29.8	21.0
30.	It made me feel bad to go back to do a section when I answered incorrectly.	1	34.5	13.8	51.7
		2	28.6	39.3	32.1
		T	31.6	26.3	42.1
2.	Programmed teaching is good because some students are not left behind other students in the class.	1	37.9	27.6	34.5
		2	42.9	32.1	25.0
		T	40.4	29.8	29.8
6.	Programmed teaching is a boring way to learn.	1	44.8	6.9	48.3
		2	42.9	28.6	28.6
		T	43.9	17.5	38.6
14.	Programmed teaching would be be better used as homework than in the classroom.	1	27.6	41.4	31.0
		2	39.3	32.1	28.6
		T	33.5	36.8	27.8
5.	Programmed teaching is interesting because it is new.	1	24.1	34.5	41.4
		2	32.1	28.6	39.3
		T	31.6	28.1	40.4

Item No.	Statements of Attitude	Group	Agree	Uncertain	Disagree
19.	I would like to learn another skill (how to do something) by this new method.	1	24.1	31.0	44.8
		2	32.1	28.6	39.3
		T	28.1	29.8	42.1
26.	It is not fair for part of the class to skip when the remainder have to do every frame.	1	27.6	41.4	31.0
		2	60.7	25.0	13.8
		T	43.9	33.5	22.8
15.	I believe I could have learned more about the sewing machine from teacher demonstrations.	1	58.6	13.8	27.6
		2	53.6	28.6	17.9
		T	56.1	21.1	22.8
8.	Programmed teaching is boring because the facts are repeated too many times.	1	44.8	31.0	24.1
		2	64.3	17.9	17.9
		T	54.4	24.6	56.1
17.	I would like to have <u>part</u> of my courses programmed.	1	20.7	24.1	55.1
		2	17.9	25.0	57.1
		T	19.3	24.6	56.1
4.	Programmed teaching is more interesting than other methods of teaching.	1	13.8	10.3	75.9
		2	10.3	17.9	71.4
		T	12.3	14.0	73.7
20.	The more I worked with programmed materials the better I liked them.	1	6.9	17.2	75.7
		2	10.3	25.0	64.3
		T	8.8	21.1	70.2
7.	Teachers can teach better than a program can teach.	1	65.5	24.1	10.3
		2	67.9	25.0	7.1
		T	66.7	24.6	8.8
3.	Programmed teaching is a better way to learn than other methods of teaching.	1	10.3	20.7	70.0
		2	3.6	28.6	67.7
		T	7.0	24.6	68.8
16.	I would like to have <u>all</u> my high school courses programmed.	1	0	10.3	89.7
		2	3.6	10.3	85.7
		T	1.8	10.3	87.7
24.	Programmed teaching is bad when there is not enough equipment for each person.	1	100.0	0	0
		2	92.9	0	7.1
		T	96.5	0	3.5