

participatory responses. Several studies (e.g., Maccoby, Michael and Levine, 1961; Michael and Maccoby, 1961) have consistently found that immediate reinforcement of these responses had a positive effect upon student performance even when the responses were covert. Therefore, in seeking a powerful treatment to train any particular problem-solving behavior, it was postulated that the factors of requesting overt responses from the subjects and subsequently reinforcing those responses which are correct could be paired effectively with modeling strategies.

Media. The use of video-tape has been encouraged by several leaders in the guidance profession (Wrenn, 1962; Magoon, 1964). Major advantages to this medium are a reproducible sequence of events generated at relatively low cost, and the ease with which competing media such as audio-tape and written booklets can be made comparable in content. However, when compared to audio-tape and written materials, video-tape becomes an elaborate and expensive medium for experimentation in the schools, so strategies relying on audio-tape and written booklets need to be explored as well. While the lecture method has frequently proven less adequate than other methods of teaching (e.g., Lewis, 1964) or only as adequate (e.g., Ulrich and Pray, 1965), it remains a dominant approach in both secondary and higher education. However, the preponderance of research has tested the effectiveness of lecture through information recall based on paper-and-pencil tests rather than through overt performance of some complex behavior. In spite of this fact, it was decided that a traditional live lecture strategy, not just audio and video-tape strategies, and booklet presentations, should be given ample opportunity to demonstrate its usefulness for a comprehensive training program of problem-solving behaviors.

Chapter Summary

The guidance profession has set as one of its major goals assisting individuals to solve personal problems wisely. Several theoretical and research traditions have contributed to the current degree of knowledge held concerning personal problem solving, but each, by itself, is inadequate as either a total explanation of the relevant phenomena or as a model of successful research strategies for the training of effective problem solvers. It seems most productive at this juncture to attempt directly the training of overt behaviors which are postulated to be requisite to the wise solution of real-life problems rather than to engage in attempts at less direct interventions such as the influencing of thought processes or mental skills. The lack of research studies dealing with differentiation on a behavioral basis of effective and ineffective problem solvers, however, necessitates that the behaviors thought to be requisite to effective personal problem solving be inferred from a study of available problem-solving descriptions and paradigms. Previous attempts at training effective problem-solvers as well as related independent research investigations yield a number of insights as to needed improvements in real-life problem-solving research. There must be clear and specific training objectives which indicate what those being trained will be able to do when the training has been completed. An acceptable training effort must also encourage transfer of what is learned to a wide variety of real-life problem situations. Additionally, research must focus on personal characteristics which may influence the effectiveness of various training strategies rather than upon psychological traits which are thought to be associated with some unitary construct of problem-solving

ability. Improved techniques for both accurate and sensitive measurement of both the process and product of problem-solving are needed. In this manner any behaviors which are truly requisite to effective personal problem solving may be validated and the issue of exactly what procedures result in what changes in which subjects can be clarified.

The research outlined in the remainder of this report was an initial investigation aimed at bringing about some of the improvements noted above preliminary to the development of a personal problem-solving training program. It attempted to explore potentially useful training strategies and the influence of an important subject characteristic upon the training of what was postulated to be a key behavioral area in the personal problem-solving process. The specific behaviors investigated as well as the design and procedures employed in the study are discussed in Chapter II.

II. EXPERIMENTAL DESIGN AND PROCEDURES

Skill Area To Be Investigated

The problem-solving skill area that has been chosen for initial study is the generation and consideration of several alternative solutions or courses of action prior to selecting one alternative for implementation. A specification of the behaviors that could be appropriately included in this selected skill area is found on page 22. Previous research relative to this skill area has been primarily concerned with assisting individuals to generate increased numbers of alternatives usually through being trained to produce a number of different responses when they were confronted with the same recurring stimulus. Such a task probably has little personal relevance to each individual. Only the Evans and Cody (1969) study cited earlier included a concern for training an individual to consider several relevant alternatives before making a decision in contrast to merely generating several alternatives. And the experimental task involved something akin to real-life problems.

There is a distinction, therefore, between the concepts of "generating" and "considering" alternatives. In personal problem-solving contexts, it does little if any good to produce possible solutions if (in reality) they are never considered before an alternative is chosen. This investigation will focus upon increasing the quantity and quality of consideration given by subjects to alternative solutions which are provided. The word "considered" is used to indicate that attention is given to each alternative and that the possible outcomes of each are explored. In effect, the individual spends time studying each alternative in some

depth before discarding or accepting it. Even if he can generate alternatives in response to a particular stimulus, he also must be sufficiently open to consider these alternatives, regardless of whether or not they are provided for him by outside sources. The effective problem-solver might well show greater latency in responding though the use of a simple time criterion has been cautioned against earlier.

The main rationale for the selection of this skill lies in its effect upon the whole problem-solving process. A growing body of literature on post-decision dissonance seems to indicate that if one focuses on one possible alternative solution to a problem subsequent to the actual decision, it becomes more difficult to examine information conflicting with the alternative chosen, and similarly more difficult to examine objectively the outcomes of whatever solution is chosen (Brehm and Cohn, 1962). Thus, without the consideration of several relevant alternatives, the problem-solving process is curtailed. In contrast, the individual who sets out to consider several alternatives before selecting one is more likely to be open to incoming information, to utilize that information, to generate further alternatives, and to have a better framework for sorting relevant from irrelevant information concerning these alternatives.

Two further advantages for individuals having proficiency in this skill area exist. First, it seems logical that the consideration of several alternatives increases the probability of selecting a successful (i.e., one producing outcomes most personally satisfying to the individual) alternative. Second, it is likely that a second choice alternative will be available so that it can be adopted as a backup plan to be employed in

case the implementation of the individual's first choice is in some way frustrated.

What kind of experiences would maximize the probability that an individual would consider more than one alternative solution when he was confronted with a personal problem? The purpose of this research was to assess the differential effects of various training strategies upon high school students' reported and actual instances of considering multiple alternatives. The differential effects of three major audio-visual media (video-tape, audio-tape, and booklet) were to be examined as were the effects of combining each of these media with overt participation and social reinforcement of desirable responses. Any interactions existing between these treatment factors and the sex of the subject were also to be assessed.

Experimental Design

Subjects. A device developed especially for the present study, a copy of which appears as Appendix I, was administered to 285 eleventh-graders at a San Francisco Bay Area secondary school located in a low and middle income community. Items were constructed so as to assess the students' need for training in problem-solving behaviors (e.g., I often make a decision without considering several possible solutions to a problem). As part of the same device, the students were asked if they would be interested in learning how to solve problems more effectively. As can be noted from a study of Appendix I, the ten statements which deal with the subjects current problem-solving behavior are to some degree counterbalanced as to direction. A response of "true" to statements #1, #3, #6 and #10, and a "false" response to items #2, #4, #5,

#7, #8 and #9 indicate that the subject is currently performing a desirable personal problem-solving behavior. All respondents who indicated that they did not usually consider many different solutions when solving a problem and who responded positively to either item #11 or #12 were placed in a pool of potential subjects. Secondly, any student whose responses indicated that he did not usually exhibit at least three of the desirable problem-solving behaviors and who responded positively to either item #1 or #2 were added to the subject pool. Lastly, subjects showing either of the above patterns of responses but who did not respond favorably to statements #11 and #12 were added to make a total of 175 students in the pool. Only approximately 25 students, however, were gleaned from this last procedure. From this subject pool, 128 students were randomly selected and assigned, equally divided as to sex, to one of eight treatment conditions. The remaining members of the subject pool were designated as alternates.

Treatments

1. Video-tape model without reinforcement. After receiving the standardized introductory remarks from an experimental assistant, this treatment group viewed a video-tape illustrating a male model whose age corresponded to that of students in the eleventh grade, and who confronted and solved a problem in his own life. The problem of how to spend a summer vacation was chosen since it was thought to be representative of those faced by secondary school students. The video-tape was predominantly concerned with the model's attempts to consider several alternatives before he selected and implemented a solution. Subsequently, the model experienced pleasant consequences as a result of the alternative he chose.

As he worked on solving the problem the model's comments emphasized and made clear the importance of the behaviors under investigation, how to perform the behaviors, and the results of doing so. Other characters in the video-tape provided examples of inappropriate responses to a similar problem situation. A copy of the script of this video-tape, which was produced with the assistance of the San Jose Unified School District in California, appears as Appendix B.

2. Audio-tape model without reinforcement. These subjects were exposed to a tape recording of the sound track from the video-tape. Thus the desired verbal behaviors were modeled for them but without the visual dimension.

3. Written model without reinforcement. A type script of the sound track from the video-tape was presented to this treatment group. The dialogue was preserved and thus the students were still exposed to a demonstration of the desired behaviors though action and sound elements found in the video-tapes were not present.

4. Video-tape model with reinforcement. Once again, the video-tape used in Treatment 1 was presented. However, at selected points the tape was stopped. During each pause, each subject was asked by the experimental assistant if he felt the model should now make a decision. If an individual indicated that he felt the model should not make a decision and should consider additional alternatives, the experimenter reinforced the subject socially through making a positive verbal statement as he recorded the subject's response. Each experimental assistant was provided with a list of verbal statements which were appropriate for use

in this context. These appear as part of the "Instructions to Experimental Assistants" in Appendix A. Each subject received three opportunities for reinforcement and the reinforcement was always administered in the presence of other subjects in that treatment condition. The subjects in each condition involving social reinforcement were always asked questions in the same order. The responses of each subject to these questions were recorded but were not used in data analyses. As reported earlier, the reinforcement treatment procedure added approximately ten minutes to a treatment session.

5. Audio-tape model with reinforcement. The same procedures were followed as are outlined in Treatment 4 with the soundtrack from the video-tape rather than the video-tape itself being utilized.

6. Written model with reinforcement. Derived from the video-tape, the typescript in booklet form was again used. When each subject reached selected typescript points equivalent to the corresponding points in the video-tape, he was instructed in the text to stop reading momentarily. When all subjects had reached the "stop" instructions, the reinforcement procedures outlined in Treatment 4 were employed.

7. Oral lecture. A direct didactic approach to developing the problem-solving behaviors under investigation was used in this treatment condition. Subjects were seated in a classroom and received an introduction describing the purpose of the meeting followed by a 25 to 30 minute prepared lecture using vocabulary appropriate to the eleventh-grade level, and stressing the importance of solving personal problems wisely and elaborating on the importance of considering several alternatives

before choosing a solution. A copy of this script is contained in Appendix C. The danger of considering too many alternatives and thereby not making a decision is mentioned. The effect of this problem-solving skill area on other skill areas in the decision-making process was highlighted and examples of consequences resulting from exhibiting this behavior were used. Several suggestions as to what students should do in order to start manifesting effective behaviors in this area were included. This treatment provided the fourth main medium studied here.

8. Control. A final group of subjects received the same introductory and concluding remarks from an experimental assistant but were not exposed to any materials relevant to the solving of personal problems. Instead, they responded for 30 minutes to written materials (i.e., programmed instructions in statistics) which had no apparent relation to personal problem solving. The assistant was instructed to avoid answering any additional questions or to reply that she did not have the answer to the question.

Criterion Instruments and Measures. From three criterion instruments, a total of nine criterion measures were developed to serve as dependent variables. Seven of that number were derived from two simulated problem-solving situations which were individually administered to subjects. The first of these situations assessed each subject's performance of the desired problem-solving behaviors by using a situation in which each subject was asked to assist a hypothetical problem solver with a personal problem. The second simulation assessed manifestation of the desired behaviors by having each subject select a personal problem of

his own and subsequently select a person to help him resolve that problem.

These two simulation criterion instruments embodied at least two advantages. First, the problem situations to which subjects were exposed were standardized, and second, the problems utilized were indeed of a real-life type. The second simulation had an additional advantage in that the problem situation was somewhat individualized in that the subject selected an individual to assist him with one of his own personal problems. Behaviors exhibited in these simulations were objectively quantifiable and thus amenable to statistical analysis. By utilizing situational assessment procedures, the probability of assessing the quantity and quality of the consideration given to alternative problem solutions was substantially increased. While it may be argued that the amount of time available to subjects in both situations should have been unlimited, real-life problem situations seldom have such temporal freedom. The time limits established should not have been too restrictive, it is true, but preliminary field testing indicated that within a ten minute period most of the information available in each simulation could be secured.

The three criterion instruments and their respective criterion measures are described in the following sections. Since both simulated situations involved equipment usage, each subject was provided with a written instruction sheet and a demonstration of any behaviors necessary for participation (e.g., operating the slide or tape equipment). The assistant was instructed to require each student to exhibit these behaviors before the criterion period began.

1. Hypothetical Problem Situation. Seated in a semi-darkened room, each subject was given verbal instructions with an identical written

instruction sheet and a program describing briefly 32 slides which were available in envelopes on a nearby table. This "Instruction Sheet and Slide Program" appears as Appendix D. Each subject was informed that when the projector was switched on he would be confronted with a description of a problem situation facing a hypothetical student, Jerry, and that he would be allotted ten minutes to decide on a solution to Jerry's problem. In order to assist him in arriving at a decision, he was informed that his "Instruction Sheet and Slide Program" described a number of slides providing information which might be useful in arriving at a solution to Jerry's problem. The slides were placed in categories and each presented a statement describing the interests, abilities, values and background experiences of the hypothetical problem solver; available activities in which Jerry could participate, several alternative courses of action that could be taken; and several consequences that could result from each alternative action. Each category of slides was placed in a separate envelope. A complete set of the slide captions can be found in Appendix E.

Each subject was allowed to select as many slides, and in any order, as he wished. The form used by the observer in collecting data from this criterion measure is found in Appendix F. All slides were placed in envelopes on a nearby table. Subjects were allowed to utilize as much of the ten minutes as they needed. However, they were informed that they must remain in the testing room for the entire ten-minute period allotted for solving the problem. In the event that a subject wished to turn his attention away from the problem-solving task for a portion of the allotted time, alternate activities (i.e., reading materials of interest to students of this age group) were provided in the testing room.

From the first criterion device, the Hypothetical Problem Situation, the number of slides presenting a possible solution to the problem viewed by the subject was accepted as an indication of the number of alternatives to which he gave some consideration. A second criterion measure from this instrument was a measure of the emphasis or degree of attention given by a subject to slides in the "alternative" category. For each subject, a ratio was formed with the number of seconds spent viewing alternative slides as the numerator and the total number of seconds spent viewing alternative slides as the denominator. This ratio was formed since a simple tally of the number of seconds during which "alternative" slides were viewed would make it possible for an individual who had viewed only one "alternative" slide for a large number of seconds to score high on this criterion measure. This ratio was then multiplied by the number of alternative slides viewed in order to weight appropriately the consideration of an optimal number of alternatives. Another, perhaps more sophisticated, problem-solving behavior within the skill area of considering multiple alternatives is studying the possible consequences of each alternative. In order to approximate an assessment of the extra effort that is necessary in real-life in order to learn the possible outcomes of implementing a particular alternative course of action, the slides providing this information for each alternative were packaged separately from the slide actually presenting the specific alternative problem solution. Thus, by receiving the "alternative" slide found inside each information envelope, each subject learned about a specific alternative problem solution to the problem, but he had to open at least one other package within the same information envelope in order to learn about the possible outcomes

associated with the implementation of that alternative. While it could be argued that the nature of this criterion measure would be highly correlated with and thus compound the results from criterion C above, such an argument would have to proceed from empirical data since a high correlation between the two criterion measures is not evident prima facie. Since "alternative" slides and "outcome" slides were wrapped separately, each subject could select neither type, one or the other type, or both types from the envelope. That is, entering the envelope for one type of slide did not necessitate viewing the second type of slide. However, to further examine this issue among others, a complete matrix of correlations between dependent variables is reported subsequently as Table 10. The number of slides viewed from the "outcome" category was tallied and provided this instrument's third criterion measure.

The fourth criterion measure from this instrument was the emphasis or degree of attention each subject gave to the consideration of outcomes. A ratio of the number of seconds spent viewing slides from the outcome category over the total number of seconds during which all slides were viewed was multiplied by the number of outcome slides viewed by the subject in order to correct for inefficient or inattentive viewing of only a few "outcome" slides for a large number of seconds. The fifth criterion was the problem solution selected by the subject. Of the six alternative solutions to the problem, three were deliberately structured so as to be more appropriate, based on the information available. Note was taken of whether or not each subject selected one of the more appropriate answers

2. Personal Problem Situation. In this second simulation, each subject was again given oral instructions with an accompanying written instruction sheet and was told to think of a problem he currently was facing in his own life. It was indicated that the problem should be of real importance to him; for example, it might be something he wanted to achieve, such as to overcome an undesirable behavior. He was given an opportunity to write the problem down if he wished. The key task in this simulation was the selection from an array of alternative hypothetical persons, the one the subject felt he would most like to assist him in solving his personal problem.

Information on each of six hypothetical individuals was placed in a series of five packets. Inside one of these five packets was a photograph of the individual while the other packets each contained a tape cartridge providing information on the hypothetical individual's interests, values, abilities, and background (e.g., previous significant experiences and future plans). Complete scripts of the tape cartridges are included as Appendix G. An "Instruction Sheet and Information Packet Program" describing in general terms the information available on each hypothetical individual was given to each student. A copy of this material forms Appendix H. Once again each subject was informed that he must remain in the testing room for the full ten minutes allotted for solving the problem. Alternative activities were available in the testing room if the subject chose to spend time on something other than the criterion task. In this simulation, several tape cartridges containing both popular and classical music were provided as alternate activities. Such materials were provided in both problem-solving simulations to answer at least to some degree the objection that subjects would do well on the dependent variables simply

because no activity outside of the problem-solving task was available to them.

The Personal Problem Situation simulation yielded two criterion measures. The first of these was the number of hypothetical individuals about whom each subject sampled some information. This provided an indication of the number of alternatives receiving some consideration. A second criterion measure from this instrument assessed the emphasis or degree of attention each subject gave to each alternative. A score was obtained for each subject by assigning five points to his first selection of information from each alternative available, four points for a second selection from the same alternative, and so forth. Through this weighting procedure, both the breadth and depth of selections was rewarded. Appendix K provides examples of how sample scores on this criterion measure were obtained.

For this criterion measure, the final choice was not scored or used in data analysis since there were no "correct" responses as there were in the other simulation criterion. The form which appears as Appendix F was used by the assistant to record subject behavior during this problem-solving simulation.

3. Checklist for Solving Problems in Real Life. Additional criterion measures were derived from the pre- and post-treatment administrations of the "Checklist for Solving Problems in Real Life," a copy of which is provided in Appendix I. This instrument, composed of 12 statements describing personal problem-solving behaviors, was designed to assess each subject's need and desire for training in effective problem-solving behaviors. For statements one through ten, each subject

had to decide if the statement accurately reflected his usual problem-solving behaviors. If it did, he placed a checkmark in the column labeled "True"; if it did not, a checkmark was placed in the column marked "False." The statements were counterbalanced as to direction so that, for example, a "True" response sometimes denoted a desirable, and at other times an undesirable personal problem-solving behavior. Statements one through ten on this instrument were designed to reflect whether or not the subject typically exhibited behavior in each of the six skill areas of problem-solving when he attempted to solve his own personal problems.

Statements 11 and 12 gave each subject an opportunity to express in two ways a desire for receiving training in effective personal problem solving. In statement 11, each subject could express an interest in general improvement of his problem-solving behavior; while in response to statement 12, he could make a specific request for training in the behaviors described in statements one through ten. Responses to these statements by the subjects prior to and after exposure to the various treatment experiences were examined and two specific criterion measures were formulated from changes in these responses. The changes in subject responses to this instrument were closely examined and yielded two criterion measures. The first criterion measure involved changes in the self reports of personal problem-solving behaviors provided by each subject between the pre- and post-administration of this check list. For example, if a subject reported before the experiment began that he did not usually consider many different ways to solve a problem (i.e., he checked "False" opposite statement 1), and subsequently at the end of the experiment responded that he did usually consider many different ways to

solve a problem (i.e., he checked "True" opposite that statement), one point was assigned. Similarly, for each response which changed in an unfavorable direction (i.e., either a subject reported that he no longer performed a desirable behavior or reported that he now performed an undesirable problem-solving behavior which he previously did not perform), a point was subtracted from the subject's score on this criterion measure. Appendix L illustrates responses scored in a positive and in a negative manner. Due to the fact that both positive and negative scores resulted from this scoring procedure, all scores were transformed by assigning the lowest score obtained a value of zero, thus eliminating the possibility of negative scores.

A second criterion measure derived from this checklist involved the tabulation of requests for assistance made by students. Positive responses to statements 11 and 12 of the checklist indicated such requests for assistance. Additionally, students were asked to circle the number of each statement specifying a behavior with which they wished some help. All requests were tallied for both administrations of the instrument so that a subject's score corresponded to the change in such requests for assistance. For example, if a subject responded positively to both statements 11 and 12 and circled five statements in the pre-experimental administration of the instrument, he was scored as having made seven requests for assistance. Subsequently, if the same subject responded in a positive manner to only statement 11 and circled two statements on the post-treatment administration of the instrument, he was credited with three requests for assistance after having received the treatment. This subject made four fewer requests for assistance after having received the treatment. Here again, negative scores were possible since an individual might actually

make more requests for assistance after, as compared to before, the treatment. Scores were again transformed in the manner noted above to eliminate negative values. It was expected that effective training would reduce the assistance requests made by each subject.

Hypotheses

The research hypotheses were as follows:

1. Subjects assigned to the video-tape with reinforcement treatment will score higher on the criteria than will subjects assigned to any other treatment condition.
2. Subjects assigned to the three treatment conditions involving social reinforcement will score higher on the criteria than will subjects exposed to similar conditions not involving social reinforcement.
3. Subjects assigned to the two video-tape treatment conditions will score higher on the criteria than will subjects assigned to the two treatments involving written booklets or to the two treatments involving audio-tape, or to a treatment involving an oral lecture, or to the baseline control condition.
4. Subjects assigned to the two audio-tape treatment conditions will score higher on the criteria than will subjects assigned to the two treatments involving written booklets.
5. Subjects assigned to the oral lecture treatment condition will score higher on the criteria than will subjects assigned to the baseline control treatment.

No interactions between media, the use of reinforcement, and the sex of subjects were hypothesized.

Experimental Procedures

Treatment Procedures. Each treatment group was convened in separate rooms within the counseling center at the school and all groups were exposed to treatment experiences within a span of four days. Thus, an attempt was made to minimize the confounding effects of students in different treatment groups spreading information to each other about the study. Though each treatment group had been assigned a specific time to convene and specific subjects had been assigned to each treatment, several changes in the subject composition of each group were necessitated by the realities of the school situation. Factors such as teacher refusal to dismiss a student from class, inefficiency of the system by which messages were hand-carried to classrooms in advance of the scheduled appointment time, and a heavy absentee rate all worked against the administration of treatment procedures as previously planned. However, additional subjects were drawn on a sequential basis from the list of alternates formed earlier from the original subject pool. Additionally, subjects were shifted from one treatment group to another in some instances due to the need to run particular treatment groups at a pre-determined time during the school day. Determinations as to exactly who was shifted to which treatments were an on-the-spot function of the number of subjects assigned to each treatment group who had arrived by a given time and the particular treatments occurring at that hour which had of necessity to be run. Both the limited availability and expense of equipment (e.g., video-tape recorder/player) as well as the limited availability of space in the school counseling center contributed to this need. Since the 128 subjects were chosen originally in a random fashion from the pool of 175 subjects, it was presumed that the remaining

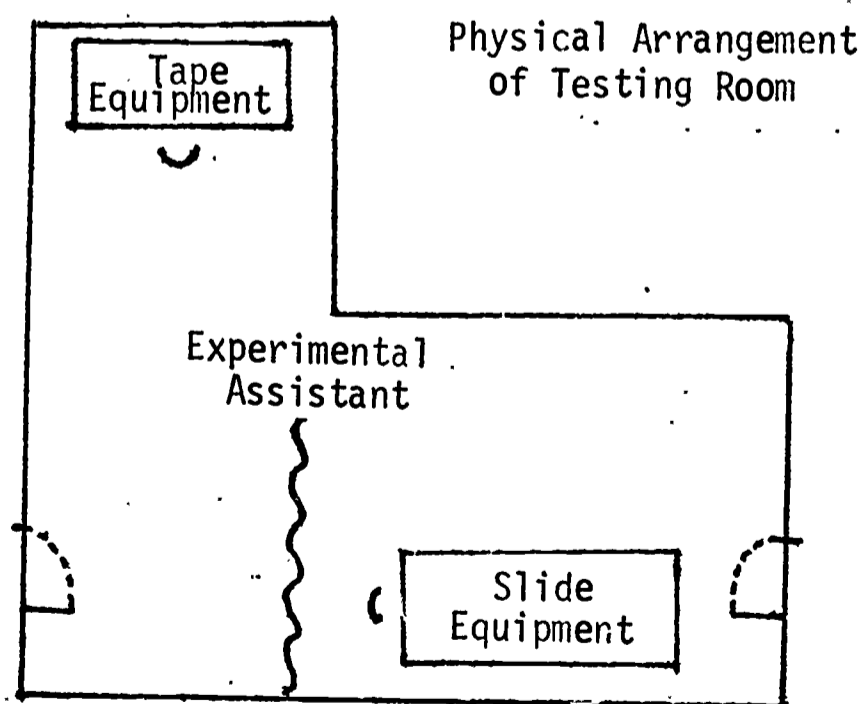
47 subjects formed a random group, and subjects were chosen on a sequential basis from the list of alternates.

The subjects were greeted by an experimental assistant as they arrived at the counseling center and were assigned to the correct room. As soon as the eight assigned students or the required number of replacement subjects had arrived, the treatment was begun. Each treatment not involving the use of social reinforcement was administered in one session of approximately 30 minutes. Those treatments involving social reinforcement procedures took approximately ten minutes longer. It was assumed that the additional ten minutes necessary to the administration of the treatments involving social reinforcement was of no importance as a discrete variable, the social reinforcement procedures alone accounting for any differences resulting on the dependent variables. A standardized set of opening and closing remarks, a copy of which appears in Appendix A, was given by an experimental assistant. After the closing remarks, the subjects were allowed to return to their classes. Subjects were told in the introductory remarks that there was much concern about the importance of students knowing how to solve real-life problems wisely, and that materials had been prepared to help them learn effective personal problem-solving. A copy of this opening statement appears as a portion of Appendix A. Following these remarks the various treatment experiences described earlier were administered. No information regarding the purpose of what was being done, other than the information contained in the opening statement, was given to the subjects.

Data Collection Procedures. Beginning six days following the completion of the treatment procedures, the subjects were summoned

individually in random order to the counseling suite of the high school in which the study took place. Upon his or her arrival, each was greeted by an experimental assistant who explained that since the student had been so helpful in trying out materials the previous week, he had been called in again, this time for the purpose of giving student reactions to some new guidance materials. After reading the instructions provided for the first simulation, each subject entered into the experimental room where both simulation situations were arranged. An L-shaped room was provided for data collection so that different subjects in the two simulations could work simultaneously with minimum interference to each other. In addition, a partial partition was placed between the sections of the room to facilitate this separation. Another advantage to this procedure was that the observer was not conspicuous in the criterion situations since she was both partially screened by the partition and had to divide her attention between two subjects working on different tasks, as shown in Figure 4 below.

FIGURE 4



After being shown the procedure for operating the slide projector used in the first simulation, each subject began the task. A number of

subjects experienced difficulty with this task or with the operating of the tape cassette machine, necessitating on some occasions that both subjects being exposed to the criterion devices stop while further assistance was provided by the experimental assistant or by another of the subjects. At the end of ten minutes, he was asked to choose a solution to the problem, then was led to the section of the room utilized for the second simulation situation, and was provided with the instruction sheet for that simulation. Brief instructions were given regarding the use of the tape cassette player just before each subject began the criterion task. At the end of ten minutes, each subject was requested to indicate the person whom he would most like to have assist him in solving a personal problem. Before each subject left the experimental room, he completed a reaction sheet on which were printed several questions designed to elicit his reactions to the guidance materials he had just used. These reaction sheets were included to give subjects the impression that they were evaluating guidance materials as had been explained to them earlier. A copy of this reaction sheet is found in Appendix J. Accompanying the reaction sheet was a copy of the "Checklist for Solving Problems in Real Life," included as Appendix I, to which he was asked to respond once again. He was thanked for his participation and was told to leave the materials with the assistant outside the room when he was finished. Data collection was spread over a period of two weeks due to the unavailability of students at scheduled times. Criterion data were obtained from a total of 110 of the original 128 subjects. The remaining 18 subjects were lost due to their absence or unavailability during the data collection period at the school.

Statistical Procedures

These then were the nine dependent variables derived from the criterion instruments. Subsequent computer analyses of the collected data were undertaken at the Stanford Computer Facility on an IBM 360/67 computer with computer programs drawn from the BMD Biomedical Computer Programs (Dixon, 1967).

First, BMD program 07D was run on the data from all criteria. This program provided histograms, means and standard deviations for subjects in all treatment groups on each of nine criteria, and facilitated checks on the accuracy of the data. Also available from the program were one-way analyses of variance across all treatment groups on each of the criteria and correlation matrices of the intercorrelations of criterion scores within each treatment group.

Subsequent to this analysis, one criterion measure (i.e., the alternative solution selected by the subject in the Hypothetical Problem Situation simulation) was extracted due to its dichotomous distribution, and dealt with separately through chi-square procedures in an attempt to uncover any significant difference existing between the number of subjects selecting each possible solution to the problem in each of the treatment groups. The first chi-square test compared each of the treatment groups with a combined control group composed of lecture and baseline control conditions and the subsequent two tests compared the effects of treatments utilizing various training media (i.e., video-tape, audio-tape, written booklet) and the effects of treatments in which social reinforcement techniques were and were not employed.

The remaining eight criterion measures underwent three-way analysis of variance procedures implemented through the running of BMD

program 05V. A 2 x 2 x 6 design was employed in a search for main and interaction effects of sex, reinforcement, and treatment group. Treatment groups seven and eight (i.e., lecture and control treatments) were not included in these analyses due to the lack of parallel treatment groups employing reinforcement procedures as noted earlier.

These analyses were followed by t-tests comparing the effects of the lecture and control groups on each of these criterion measures in order to study the feasibility of collapsing these two treatment groups into a single combined control group. Since no significant t's were uncovered, the two groups were subsequently combined and further t-tests were calculated comparing the effect of this combined control group with the effect of each of the remaining six treatment groups on each of the eight criterion measures.

III. RESULTS AND DISCUSSION

Results

Results on a total of nine criteria derived from the three major criterion measures were obtained. Explanations of the derivations of these criteria listed below are found in Chapter II. The reporting of results relative to these criteria will be organized primarily around the sequence of statistical analyses that were employed. Subsequently, each hypothesis will be discussed in light of the results reported and with regard to possible explanations for such results. In some instances, results of criteria will be reported in an order other than that followed in the list of criteria below. For example, it might be more meaningful to discuss simultaneously results on analogous criteria from two different criterion measures rather than to present them in the order assigned.

1. Hypothetical Problem Simulation

- A. Number of viewed slides presenting a possible alternative problem solution.
- B. Time given to slides presenting alternatives in relation to total time viewing all slides.
- C. Number of viewed slides presenting information on the possible outcomes associated with the implementation of particular alternatives.
- D. Time given to slides presenting information on the possible outcomes of alternatives in relation to total time viewing all slides.
- E. Rated appropriateness of the alternative selected as "best."

2. Personal Problem Simulation

- F. Number of hypothetical individuals (i.e., alternatives) about whom some information was selected.
- G. Rated efficiency of information packet selections within and across hypothetical individuals (i.e., alternatives).

3. Checklist for Solving Problems in Real Life

- H. Net increase (i.e., pre- and post-treatment) in each subject's self-reports of desirable personal problem-solving behaviors.
- I. Net decrease (i.e., pre- and post-treatment) in the number of written requests for assistance with personal problem-solving behaviors.

Overall Treatment Effects and Comparison of Active vs. Baseline

Control Treatments. In an initial attempt to uncover any gross differences in treatment effects, the BMD program 07D was run on each of the nine criteria. This procedure included the computation of a one-way analysis of variance on each criterion. The resultant means and F ratios appear as Table 1. Desired levels of statistical significance were set at $p < .10$ and $p < .05$ for all analyses. In comparing the active and baseline control groups, no differences at the desired levels of significance were found though in the case of two variables, A and C, significance was approached, ($p < .25$). The two variables on which these trends were found were of considerable interest in this investigation. While findings at the $p < .25$ level of significance are not noted in the data tables and seldom considered in most professional literature, they will from time to time be mentioned in the text. The rationale for reporting such findings lies in their usefulness as clues for future investigations and in the importance of such trends when the research deals with complex behaviors which are exhibited in contexts which are not amenable to tight control of all potentially confounding variables (i.e., non-laboratory settings).

To determine whether the lecture treatment differed from the baseline

TABLE 1
N's, MEANS, SD's, AND ONE-WAY ANOVA F RATIOS FOR RAW SCORES ON EACH OF NINE DEPENDENT VARIABLES

Dependent Variable	TREATMENT CONDITION										One-Way ANOVA F Ratio
	Video-Tape without Reinforcement	Audio-Tape without Reinforcement	Written Booklet without Reinforcement	Video-Tape with Reinforcement	Audio-Tape with Reinforcement	Written Booklet with Reinforcement	Lecture	Baseline Control			
A. Number of viewed slides presenting a possible alternative problem solution.	\bar{X} 3.467 σ 1.552 N 15	3.571 2.027 14	2.333 2.015 12	3.933 1.223 15	3.308 1.702 13	4.167 1.528 12	3.692 1.548 13	4.067 1.710 15	1.505		
B. Time given to slides presenting alternatives in relation to total time viewing all slides.	\bar{X} 47.267 σ 33.553 N 15	74.357 114.604 14	26.583 33.776 12	46.933 29.581 15	45.923 53.641 13	58.583 51.235 12	62.769 44.389 13	82.200 72.691 15	1.153		
C. Number of viewed slides presenting information on the possible outcomes associated with the implementation of particular alternatives.	\bar{X} 5.800 σ 3.427 N 15	4.357 3.201 14	3.083 2.875 12	5.933 2.463 15	4.385 2.815 13	5.167 2.657 12	4.692 2.287 13	5.133 1.922 15	1.469		
D. Time given to slides presenting information on the possible outcomes of alternatives in relation to total time viewing all slides.	\bar{X} 192.000 σ 144.086 N 15	130.857 143.924 14	97.500 103.379 12	133.067 119.421 15	146.846 186.230 13	186.500 161.700 12	125.154 71.538 13	153.067 86.711 15	.860		
E. Rated appropriateness of the alternative selected as "best."	\bar{X} 1.467 σ .516 N 15	1.500 .519 14	1.583 .515 12	1.733 .458 15	1.308 .480 13	1.500 .522 12	1.692 .480 13	1.733 .458 15	1.280		
F. Number of hypothetical individuals (i.e., alternatives) about whom some information was selected.	\bar{X} 4.333 σ 1.589 N 15	4.000 1.754 14	4.250 1.603 12	4.643 1.216 14	4.615 1.557 13	4.500 1.382 12	5.214 1.051 14	4.933 1.163 15	1.019		
G. Rated efficiency of information packet selections within and across hypothetical individuals (i.e., alternatives).	\bar{X} 41.600 σ 12.704 N 15	38.143 12.328 14	42.250 12.491 12	42.500 9.960 14	40.385 12.373 13	46.083 12.221 12	47.571 5.893 14	43.667 7.979 15	1.034		
H. Net increase (i.e., pre- and post-treatment) in each subject's self-reports of desirable personal problem-solving behaviors.	\bar{X} 2.070 σ 8.000 N 15	1.765 7.250 12	2.644 7.083 12	2.335 8.286 14	1.557 7.385 13	1.371 7.333 12	2.293 8.214 14	3.089 7.400 15	.595		
I. Net decrease (i.e., pre- and post-treatment) in the number of written requests for assistance with personal problem-solving behaviors.	\bar{X} 7.200 σ 1.897 N 15	6.750 1.658 12	7.250 4.245 12	7.071 1.492 14	6.692 1.932 13	6.167 1.801 12	7.786 3.093 14	6.400 2.971 15	.559		

*Statistically significant at the $\alpha < .10$ level.
 **Statistically significant at the $\alpha < .05$ level.
 ***Statistically significant at the $\alpha < .01$ level.

was not, in terms of its effects, an entity different from the baseline control treatment in which programmed statistical materials were used. In order to confirm or contradict this conclusion, t-test procedures were undertaken to compare the effect of the live lecture treatment with that of the baseline control treatment on each of eight criteria. Prior to this analysis, criterion E, owing to its dichotomous distribution was separated from the other criteria and analyzed through the use of distribution-free (i.e., non-parametric) techniques.

Table 2 presents the t-values resulting from the t-test procedures. Though in a number of cases the live-lecture group appeared to be somewhat superior to the baseline control group, none of the t-values attained desired levels of significance. Therefore, data from these two treatment groups were subsequently "pooled" for further analysis. Hereafter, except when specifically noted, this pooled control group will be referred to rather than the active and baseline control conditions as previously specified.

Pooled Control Treatment vs. Selected Experimental Treatments.

Further t-tests were then employed in an effort to uncover any existing differences between the effect of the pooled control group and the effect of each of the remaining six treatment conditions on each of the eight dependent variables involving parametric data. The results of the 48 t-tests appear as Table 3. One of the dependent variables of prime concern was variable A and with regard to this variable it is striking to note that the scores of the pooled control group actually were higher than the scores of four of the six groups with which it was compared (i.e., all three conditions not utilizing reinforcement and the audio-tape condition which did include reinforcement procedures). As can be noted from Table 3,

Table 2

RESULTS OF t-TEST PROCEDURES COMPARING EFFECTS OF ACTIVE AND BASELINE CONTROL CONDITIONS UPON EACH OF EIGHT DEPENDENT VARIABLES

Dependent Variable	t-Ratio
A. Number of viewed slides presenting a possible alternative problem solution.	0.583
B. Time given to slides presenting alternatives in relation to total time viewing all slides.	0.808
C. Number of viewed slides presenting information on the possible outcomes associated with the implementation of particular alternatives.	0.534
D. Time given to slides presenting information on the possible outcomes of alternatives in relation to total time viewing all slides.	0.887
F. Number of hypothetical individuals (i.e., alternatives) about whom some information was selected.	0.657
G. Rated efficiency of information packet selections within and across hypothetical individuals (i.e., alternatives).	0.733
H. Net increase (i.e., pre- and post-treatment) in each subject's self-reports of desirable personal problem-solving behaviors.	0.773
I. Net decrease (i.e., pre- and post-treatment) in number of written requests for assistance with personal problem-solving behaviors.	1.188

*Statistically significant at the $p < .10$ level.

**Statistically significant at the $p < .05$ level.

***Statistically significant at the $p < .01$ level.

Table 3

RESULTS OF t-TEST PROCEDURES COMPARING EFFECTS OF POOLED CONTROL CONDITION AND EACH OF THE SIX REMAINING TREATMENT CONDITIONS

Dependent Variable	Pooled Control Condition Versus					
	Video-Tape without Reinforcement	Audio-Tape without Reinforcement	Written Booklet without Reinforcement	Video-Tape with Reinforcement	Audio-Tape with Reinforcement	Written Booklet with Reinforcement
A. Number of viewed slides presenting a possible alternative problem solution.	.814	.543	*** 2.523	-.084	1.033	-.489
B. Time given to slides presenting alternatives in relation to total time viewing all slides.	* 1.492	-.042	*** 2.427	* 1.535	* 1.349	.709
C. Number of viewed slides presenting information on the possible outcomes associated with the implementation of particular alternatives.	-1.014	.679	** 2.280	* -1.380	.677	-.298
D. Time given to slides presenting information on the possible outcomes of alternatives in relation to total time viewing all slides.	* -1.484	.261	* 1.375	* -1.373	-.158	-1.182
F. Number of hypothetical individuals (i.e., alternatives) about whom some information was selected.	** 1.757	** 2.380	** 1.837	1.123	1.055	* 1.360
G. Rated efficiency of information packet selections within and across hypothetical individuals (i.e., alternatives).	1.285	** 2.419	1.034	1.116	* 1.656	-.168
H. Net increase (i.e., pre- and post-treatment) in each subject's self-reports of desirable personal problem-solving behaviors.	-.253	.623	.748	-.569	.493	.544
I. Net decrease (i.e., pre- and post-treatment) in the number of written requests for assistance with personal problem-solving behaviors.	-.148	.333	-.149	-.002	.400	.932

*Statistically significant at the $p < .10$ level.**Statistically significant at the $p < .05$ level.***Statistically significant at the $p < .01$ level.

NOTE: Comparisons were always made with the score of the pooled control group as the basic referent. Therefore, a negative t-value denotes that the mean score of the treatment in question proved to be higher than that of the pooled control group. Similarly, a positive t-value is evidence of the reverse phenomenon.

one of these differences, a comparison with the non-reinforcement booklet condition, reached a desired level of significance ($p < .01$). Only the scores of subjects in the video-tape and booklet treatments employing reinforcement procedures proved to be higher than those in the pooled control group, though not at the desired statistically significant level. A similar finding discussed below resulted on variable F in the second simulated situation.

Variable C provided information on just how many of the 12 slides presenting information on possible outcomes were viewed by the subjects. On this variable, the video-tape approach utilizing reinforcement techniques was clearly superior ($p < .10$) when compared with the pooled control effect. Two other groups, the video-tape without reinforcement condition and the written booklet combined with reinforcement, also proved more effective than the control condition, though the differences did not achieve desired levels of statistical significance. Other comparisons on this variable found the effect of both audio-tape treatments almost identical but not significantly below that of the control, and the effect of the written booklet without reinforcement significantly below ($p < .05$) that of the control.

The scores from the pooled control group on variable B proved to be significantly higher than those of subjects in the booklet without reinforcement group ($p < .01$) and higher than the scores of subjects exposed to either of the video-tape treatments or those of subjects in the audio-tape with reinforcement group ($p < .10$). The audio-tape without reinforcement and the written booklet with reinforcement treatments appeared not to differ from the pooled control in their effect. From data on this criterion, it is clear that the subjects in the pooled control group spent a greater number of seconds per slide relative to their total viewing time

on the slides they selected from the "alternative" category than did most other subjects. Information from variable D, however, presented a somewhat different picture. The relative time emphasis given to the slides from the "outcome" category showed the effect of the video-tape condition not containing reinforcement superior at a desirable level of significance ($p < .05$) to that of the pooled control, while the superiority of the parallel treatment involving reinforcement reached the $p < .10$ level. Though scores of subjects in the written booklet with reinforcement group approached significance ($p < .25$) when compared to scores of subjects in the pooled control group, scores of subjects in the two audio-tape treatments did not differ from those of control subjects and scores of subjects who experienced the written booklet without reinforcement group appeared significantly below those of subjects in the pooled control condition ($p < .10$).

t-test results relative to variable F revealed the scores of subjects in the pooled control group to be far higher ($p < .05$) than the scores of subjects in each of the three treatments not employing social reinforcement procedures and significantly higher ($p < .10$) than those of subjects exposed to the written booklet treatment which included reinforcement. Only the scores of subjects in the video-tape and audio-tape treatments with reinforcement failed to be appreciably lower than scores of subjects in the pooled control treatment. Results on variable G proved to be slightly more balanced in that the scores of subjects in the pooled control group surpassed those of only two of the six competing treatment groups. While scores from subjects in both audio-tape treatments were found to be significantly lower than those of the control subjects (without reinforcement $p < .05$, with reinforcement $p < .10$), control subjects' scores failed to differ noticeably from those attained by subjects in either the video-tape treatments or the

written booklet treatment in which no reinforcement procedures were used. The scores of subjects in the written booklet treatment using reinforcement were found to be slightly but not significantly higher than those of subjects in the pooled control group.

No t-values at desired significance levels were uncovered in data derived from two additional criteria. Variable I assessed the number of written requests for assistance in problem-solving training made by subjects after, as opposed to before, they were exposed to one of the experimental treatments. Invariably, fewer requests were made after the treatment, but no treatment was found to result in significantly more changes in this regard than any other treatment. Similarly, no significant differences at the desired levels were found on variable H which measured the ability of the various treatments to inspire changes in subjects' self-reports of their typical problem-solving behaviors.

As noted earlier, variable E, the particular alternative solution chosen by the subject as most appropriate in the Hypothetical Problem Simulation was analyzed separately through non-parametric procedures. The chi-square technique was chosen for this purpose. The $p < .10$ level of significance was chosen as the critical value for rejection of the null hypothesis that no differences existed between the number of persons in each treatment group achieving a "correct" response on this measure. Table 4 reveals that the difference between the live lecture and the baseline control group in this regard did not reach the desired level of significance. Thus once again, these two groups were combined to form a pooled control group. Subsequently, an overall chi-square analysis between treatment groups was undertaken. As can be seen in Table 5, the overall chi-square value fell short of achieving significance, but was sufficiently

Table 4

RESULTS OF CHI SQUARE PROCEDURES COMPARING THE NUMBERS OF SUBJECTS IN THE LECTURE AND BASELINE CONTROL GROUPS SELECTING AN APPROPRIATE SOLUTION TO THE HYPOTHETICAL PROBLEM SIMULATION

Treatment Group	Acceptable Response		Unacceptable Response		Marginal Totals
	Observed	Expected	Observed	Expected	
Lecture	9	9.3	4	3.7	13
Baseline Control	11	10.7	4	4.3	15
Totals	20	20.0	8	8.0	28

Obtained Value $\chi^2 = .06$

Critical Value at $p < .10$ level w/1 df = 2.71

Table 5

RESULTS OF CHI SQUARE PROCEDURES COMPARING THE NUMBERS OF SUBJECTS IN EACH TREATMENT SELECTING AN APPROPRIATE SOLUTION TO THE HYPOTHETICAL PROBLEM SIMULATION

Treatment Group	Acceptable Response		Unacceptable Response		Marginal Totals
	Observed	Expected	Observed	Expected	
Video-Tape without Reinforcement	7	8.5	8	6.5	15
Audio-Tape without Reinforcement	7	8.0	7	6.0	14
Written Booklet without Reinforcement	7	6.8	5	5.2	12
Video-Tape with Reinforcement	11	8.5	4	6.5	15
Audio-Tape with Reinforcement	4	7.4	9	5.6	13
Written Booklet with Reinforcement	6	6.8	6	5.2	12
Pooled Control	20	15.9	8	12.1	28
Totals	62	61.9	47	47.1	109

Obtained Value $\chi^2 = 8.89$

Critical Value at $p < .10$ level w/6 df = 10.64

Table 6

RESULTS OF CHI SQUARE PROCEDURES COMPARING THE NUMBER OF SUBJECTS (GROUPED ACROSS REINFORCEMENT CONDITIONS) SELECTING AN APPROPRIATE SOLUTION TO THE HYPOTHETICAL PROBLEM SIMULATION

Treatment Group	Acceptable Response		Unacceptable Response		Marginal Totals
	Observed	Expected	Observed	Expected	
Video-Tape	18	17.1	12	12.9	30
Audio-Tape	11	15.4	16	11.6	27
Written Booklet	13	13.7	11	10.4	24
Pooled Control	20	15.9	8	12.1	28
Totals	62	62.1	47	47.0	109

Obtained Value of $\chi^2 = 5.58$

Critical Value at $p < .10$ level w/3 df = 6.25

Table 7

RESULTS OF CHI SQUARE PROCEDURES COMPARING THE NUMBER OF SUBJECTS (GROUPED ACROSS MEDIA) SELECTING AN APPROPRIATE SOLUTION TO THE HYPOTHETICAL PROBLEM SIMULATION

Treatment Group	Acceptable Response		Unacceptable Response		Marginal Totals
	Observed	Expected	Observed	Expected	
Without Reinforcement	21	23.3	20	17.7	41
With Reinforcement	21	22.7	19	17.3	40
Pooled Control	20	15.9	8	12.1	28
Totals	62	61.9	47	47.1	109

Obtained Value of $\chi^2 = 3.67$

Critical Value for $p < .10$ level w/2 df = 4.60

close to the critical value to warrant further chi-square analyses which were then conducted. The first analysis, the data from which are shown in Table 6, grouped subjects according to media regardless of the reinforcement conditions used and then compared the number of each treatment group's subjects choosing one of the appropriate alternative solutions. Table 7 provides data from a second analysis which made a similar comparison between the responses of subjects in treatments employing social reinforcement and those of subjects in treatments where such techniques were not present. In both cases, the chi-square values approached, but did not reach desired levels of significance. Such results would indicate a high likelihood that there were no differences in the number of subjects selecting an appropriate response on criterion E, regardless of whether these subjects were grouped by specific treatment conditions, by the training medium to which they were exposed, or by their exposure to social reinforcement procedures.

Influence of Sex, Media, and Reinforcement Upon Selected Treatment Groups. In order to pinpoint more precisely the effects of the various treatment media, of the social reinforcement procedures, and of subjects' sex, a three-way analysis of variance (media x reinforcement x sex) was executed through use of BMD program 05V on parametric data from each of eight criterion measures. Since the live lecture and baseline control treatments did not have parallel groups employing social reinforcement procedures, these two treatments were not included in this analysis. Among the remaining six treatments, subjects exposed to video-tapes, audio-tapes, and written booklet treatments were compared, subjects experiencing social reinforcement procedures were compared with subjects not experiencing reinforcement and subjects were compared on the basis of sex. Table 8 portrays means, standard deviations and all cell sizes used in each of these analyses.

Table 8
N's, MEANS, AND SD's FOR THREE-WAY ANOVA ON EACH OF EIGHT DEPENDENT VARIABLES

Dependent Variable	Male						Female					
	Without Reinforcement			With Reinforcement			Without Reinforcement			With Reinforcement		
	Video-Tape	Audio-Tape	Written Booklet	Video-Tape	Audio-Tape	Written Booklet	Video-Tape	Audio-Tape	Written Booklet	Video-Tape	Audio-Tape	Written Booklet
A. Number of viewed slides presenting a possible alternative problem solution.	\bar{X} 3.000 σ 1.825 7	3.285 2.138 7	2.428 1.902 7	3.714 1.380 7	3.125 1.959 8	3.714 1.253 7	3.875 1.246 8	3.857 2.035 7	2.200 2.387 5	4.125 1.125 8	3.600 1.341 5	4.800 1.788 5
B. Time given to slides presenting alternatives in relation to total time viewing all slides.	\bar{X} 42.428 σ 36.059 7	80.428 150.539 7	29.571 32.160 7	39.142 31.876 7	47.500 64.258 8	58.000 49.264 7	51.500 33.060 8	68.285 75.557 7	22.399 39.348 5	53.750 27.665 8	43.399 37.326 5	59.399 59.806 5
C. Number of viewed slides presenting information on the possible outcomes associated with the implementation of particular alternatives.	\bar{X} 4.857 σ 3.933 7	3.714 3.592 7	3.142 2.794 7	5.714 2.811 7	3.750 3.105 8	5.285 2.360 7	6.625 2.924 8	5.000 2.886 7	3.000 3.316 5	6.125 2.295 8	5.400 2.190 5	5.000 3.316 5
D. Time given to slides presenting information on the possible outcomes of alternatives in relation to total time viewing all slides.	\bar{X} 149.571 σ 143.430 7	99.285 98.962 7	102.571 103.070 7	177.142 124.606 7	101.125 96.781 8	217.428 184.025 7	229.125 143.223 8	162.428 181.000 7	90.399 115.526 5	188.250 123.078 8	220.000 277.096 5	143.200 130.723 5
F. Number of hypothetical individuals (i.e., alternatives) about whom some information was selected.	\bar{X} 5.000 σ 1.527 7	3.857 1.864 7	4.714 1.380 7	4.166 1.329 6	5.000 1.309 8	4.428 1.397 7	3.750 1.488 8	4.142 1.772 7	3.600 1.816 5	5.000 1.069 8	4.000 1.870 5	4.600 1.516 5
G. Rated efficiency of information packet selections within and across hypothetical individuals (i.e., alternatives).	\bar{X} 45.857 σ 15.137 7	35.285 12.919 7	44.428 8.772 7	40.166 13.166 6	43.750 12.521 8	43.285 12.566 7	37.875 9.613 8	41.000 11.972 7	39.200 17.137 5	44.250 7.225 8	35.000 11.224 5	50.000 11.874 5
H. Net increase (i.e., pre- and post-treatment) in subject's self-reports of desirable personal problem-solving behaviors.	\bar{X} 9.428 σ 1.902 7	7.200 2.167 5	6.285 1.603 7	8.333 3.204 6	7.750 1.035 8	7.285 1.253 7	6.750 1.281 8	7.285 1.603 7	8.200 3.563 5	8.250 1.669 8	6.800 2.167 5	7.400 1.673 5
I. Net decrease (i.e., pre- and post-treatment) in the number of written requests for assistance with personal problem-solving behaviors.	\bar{X} 7.857 σ 1.772 7	5.800 .045 5	7.000 5.196 7	7.000 1.788 6	7.000 2.138 8	6.000 2.000 7	6.625 1.922 8	7.428 1.902 7	7.600 2.966 5	7.125 1.355 8	6.200 1.643 5	6.400 1.673 5

Table 9

F RATIOS OBTAINED AS THE RESULT OF THREE-WAY ANOVA (SEX x REINFORCEMENT x MEDIA)

Dependent Variable	Main Effects			Interactions			
	Sex	Reinforcement	Media	Sex x Reinforcement	Sex x Media	Reinforcement x Media	Second Order Interactions
A. Number of viewed slides presenting a possible alternative problem solution.	1.875	** 3.621	.346	.105	.026	* 2.494	.469
B. Time given to slides presenting alternatives in relation to total time viewing all slides.	.000	.006	.538	.068	.191	1.481	.001
C. Number of viewed slides presenting information on the possible outcomes associated with the implementation of particular alternatives.	1.335	1.481	* 2.528	.078	.531	.806	.154
D. Time given to slides presenting information on the possible outcomes of alternatives in relation to total time viewing all slides.	.881	1.160	.845	.142	1.326	.625	.377
F. Number of hypothetical individuals (i.e., alternatives) about whom some information was selected.	1.000	1.056	.059	1.009	.049	.063	2.238
G. Rated efficiency of information packet selections within and across hypothetical individuals (i.e., alternatives).	.111	.610	1.303	.339	.089	.242	* 2.629
H. Net increase (i.e., pre- and post-treatment) in each subject's self-reports of desirable personal problem-solving behaviors.	.351	.063	1.958	.008	* 2.427	.012	* 2.404
I. Net decrease (i.e., pre- and post-treatment) in the number of written requests for assistance with personal problem-solving behaviors.	.048	.621	.378	.150	.406	.364	1.040

*Statistically significant at the $p < .10$ level**Statistically significant at the $p < .05$ level***Statistically significant at the $p < .01$ level

Table 9 presents all the resulting F ratios. Results, in terms of both main effects and interactions, will be reported by criteria.

An analysis of variable A produced two D ratios reaching the desired significance levels of $p < .10$. The first of these was a reinforcement by media interaction which was attributable primarily to the strength added to the written booklet approach by the addition of social reinforcement procedures (cf. Table 8). In fact this treatment moved from the least effective to the most effective treatment with the females, and tied with video-tape utilizing reinforcement as the most effective treatment with males. The effect of introducing reinforcement with the video-tape strategy was more moderate. The effect of reinforcement was, however, sufficient in the case of both video-tape and written booklet that it more than offset a reversal of this result among treatment conditions employing the audio-tape. Examination of main effect results on this variable revealed that the addition of reinforcement procedures had a significant ($p < .05$) effect which resulted almost entirely from the power social reinforcement added to the written booklet and video-tape materials. Though a trend ($p < .25$) toward higher scores by females than males was found on this measure, the main effect of sex did not reach the required level of significance.

Several variable C findings appearing in Table 8 are of import. The overall media main effect was significant ($p < .10$) with video-tape, audio-tape, and written booklet strategies being effective in that order. Data from variable C were consistent with data from variable A in the sense that adding social reinforcement to the written booklet strategy consistently increased its effectiveness appreciably. In the case of the males responding on variable C, the booklet strategy moved from third to second in effectiveness when social reinforcement was added while the addition of reinforcement to the video-tape resulted in much less increase in power and in

the case of the audio-tape condition, reinforcement had virtually no increased effect at all. In regard to females, the relative order of effect remained video-tape, audio-tape, and written booklet, though the difference in means between the media appeared to be smaller and again social reinforcement made little difference in the response of audio-tape subjects and of the video-tape treatment group.

On variables B and D which dealt with the time in seconds which subjects spent viewing "alternative" and "outcome" slides, no significant F's resulted. Once again, however, the considerable increase of power attained when social reinforcement was added to the written booklet condition was apparent. In the case of both males and females, on variable B, this treatment moved from the least to the most effective with the introduction of social reinforcement. The only barrier which kept this shift from attaining statistical significance as an interaction effect seemed to be the movement in the reverse direction by the audio-tape treatments. Apparently, these trends statistically cancelled each other out. Results from variable D portrayed in Table 8 were similar with the exception that the written booklet did not increase its relative position in power among females in spite of the increased effect given it by social reinforcement. It did, however, again move from the least to the most effective with males.

Variable F, from the Personal Problem-Solving Situation, and variable H in the Hypothetical Problem Situation are analagous criteria in that they are both measures of the number of alternatives to which some consideration is given by the subject. No F ratios of desired significance are reported in Table 9 relative to variable F. However, a close study of the data in Table 8 shows the same pattern of reinforcement effects in regard to female subjects on variable F as occurred in the case of both males and females in regard to variable A, and to a large degree in the case of variables B and D as well. Specifically, this pattern involved a substantial increase in the effect of the written booklet treatment with the introduction of

reinforcement much less or no increase in the case of the video-tape medium and a decrease in the effect of the audio-tape strategy when reinforcement was introduced. Though this pattern did not hold in the case of male subjects on variable F, the reversal was minimal.

A significant sex x media interaction ($p < .10$) was one of two F ratios reaching the desired level of significance in the data from variable H appearing in Table 9. Contributing to the sex x media interaction were the apparent greater effectiveness of a video-tape strategy for males in contrast to females and a similar advantage for the written booklet strategy for females when compared to males. The effects resulting from the written booklet approach appeared to contribute little to this interaction. A main effect of media (video > audio or written booklet) approached but did not achieve the desired level of statistical significance ($p < .25$). A significant ($p < .10$) second order interaction effect on variable H revealed a pattern of opposite effects for males and females when reinforcement was added to each of the three treatment media. That is, on this variable whenever the effect of reinforcement upon a particular medium was positive for males, it was negative for females and vice versa. The effect of reinforcement was positive for females with regard to video-tape and positive for males in the case of audio-tape and written booklet strategies.

Variable G was devised to tap the degree of consideration given to alternatives by subjects in the Personal Problem-Solving Situation. Data from this criterion appearing in Table 9 revealed that the second order interaction was significant at the $p < .10$ level. Opposite effects in the case of each sex from adding reinforcement to each medium characterized this interaction. In the case of male subjects, the video-tape treatment

strategy appeared to carry more effect when not combined with social reinforcement while the reverse was true with females exposed to the same medium. The effect of reinforcement upon the audio-tape strategy was also reversed dependent upon sex, the effect being positive with males and negative with females. The interactions with regard to both variable G and variable H were thus found to be in the same direction. Finally, the written booklet decreased in effect among males with the addition of reinforcement and increased substantially among females with the same addition.

No F ratios of significance appeared in the data from variable I. All the treatment strategies seemed quite similar in their ability to bring about a decrease in the number of written requests for assistance in problem-solving training. Data trends on this variable differed from those on other variables in that the social reinforcement procedure with a written booklet did not appreciably increase the effect of such a strategy with either males or females. The same can be said for the audio-tape strategy with regard to females but not with respect to males where the opposite seemed to hold true. That is, while the effect of the audio-tape treatment among females showed the customary decrease with the introduction of social reinforcement, it increased, though not significantly, among male subjects when social reinforcement was included. With respect to the video-tape strategy, reinforcement brought lower scores among male subjects and slightly increased scores on this variable among females.

Summary of Results. Data resulting from nine dependent variables have been reported. No one treatment medium with or without reinforcement procedures was found to be superior with either males or females on all of these criteria. Rather the most effective treatment seemed to vary depending on the particular behavior being investigated and the sex of the subjects. When the scores of the live lecture and baseline control subjects were

compared, they were found to be not significantly different on any of the criteria. Subsequent to these analyses, these two treatment groups were combined to form a pooled control group. The mean score of male and female subjects in this pooled control group was compared with the mean score of male and female subjects in each of the competing treatments through t-test procedures analyzing parametric data on eight criteria. In the case of one criterion, variable E, chi-square non-parametric procedures were employed to make similar comparisons. Relative to the competing treatments, the scores of subjects in the pooled control group on the dependent variables varied substantially from criterion to criterion. Of the 48 t-ratios obtained, 16 reached desired levels of significance. Three of these were in the hypothesized direction while the remaining 13 were in the opposite direction. The three hypothesized differences at desired levels included the video-tape with reinforcement strategy on variables C ($p < .10$) and D ($p < .10$) and the video-tape without reinforcement strategy on variable D ($p < .10$) proving to be significantly superior to the pooled control condition. The pooled control condition appeared more effective than the video-tape without reinforcement condition on variables B ($p < .10$), and F ($p < .05$) and more effective than the same medium with reinforcement on variable B ($p < .10$). Similarly the pooled control condition proved more powerful than the audio-tape without reinforcement approach on variables F and G ($p < .05$) and than the same approach with reinforcement on variables B and G ($p < .10$). With regard to comparisons with the written booklet approach without reinforcement, the pooled control scores were higher at the $p < .10$ level on variable D, at the $p < .05$ level on variables F and C, and at the $p < .01$ level on variables A and B. However, only on variable F ($p < .10$) were pooled control scores significantly higher than the written booklet utilizing reinforcement.

The findings reported here should be interpreted with extreme care. Operating with the desired level of significance set at $p < .05$ and making the assumption that all the means reported were random samples from the same population mean, one would expect close to five t-tests to be significant merely as the result of chance. In the analyses reported above, while 16 t-tests were significant, only three were in the hypothesized direction. Thus, while it may be the case that the particular t-tests found to be significant may be the results of experimental efforts, they may also be the result of chance factors, replication being the major recourse for validating these results.

In order to more precisely gauge the effect of the sex, media, and reinforcement independent variables, a three-way analysis of variance (sex x media x reinforcement) was carried out on each of eight dependent variables. No main effects of sex were found to be significant at less than the 10 percent level, though on variable A, desired levels of significance were approached ($p < .25$). In terms of reinforcement main effects, data on variable H were found to be significant ($p < .05$) in that strategies containing social reinforcement proved to be of greater effect than strategies not employing the procedure. The only main effect of media found to be significant ($p < .10$) was on data for variable C, though a trend ($p < .25$) was observed with regard to data on variable H. In both cases, video-tape produced the greatest desirable increases in subjects' responses while audio-tape and written booklet strategies were less effective and about equal to one another. Of 32 interactions computed, four were found to be significant at desired levels. Thus, as noted above with regard to the t-test analyses, extreme caution must be used in interpreting these findings. Of the eight interactions involving sex x media and reinforcement c media one interaction of each type yielded an F ratio of a desired significance level ($p < .10$). The former occurred on data for variable H, with the major contributors being the greater

effectiveness of video-tape strategies with males than with females and the higher effect of audio-tape treatments with females than with males. Results associated with the written booklet strategy on this variable did not contribute to the interaction. The significant reinforcement x media interaction found in data from variable A was apparently the result primarily of the ineffectiveness brought about in the written booklet treatment from the addition of reinforcement. The addition of reinforcement in the case of video-tape and audio-tape treatments results in substantially less shift in effect. Finally, one second order interaction at less than the 10 percent level was analyzed in data from variable G and one from data on variable H. Both of these involved essentially reversed effects on the basis of sex of adding social reinforcement to each of the treatment media. Whenever the effect of reinforcement was positive for one sex, it was negative for the other sex and vice versa. With regard to the second order interaction found on variable G, video-tape and audio-tape strategies contributed in a roughly equal degree to this interaction. In contrast, the written booklet results indicated a large shift in effect among females as a result of reinforcement with a negligible negative shift among males. Relative to the second order interaction associated with criterion H, the reversed shifts among the sexes due to the effects of reinforcement were of roughly analogous magnitude in the case of each training medium. All the results reported here are discussed in the next section of this report. Initially, the discussion of results will center around the hypotheses stated in Chapter II and subsequently, it will explore reasons for, and factors contributing to the results obtained.

Discussion

Prior to a more general discussion of the results just reported, those which relate specifically to the hypotheses stated on page 65 will be discussed.

Video-tape with Reinforcement vs. Competing Treatments. Little evidence was gleaned from the data which would support the hypothesis that a video-tape strategy employing social reinforcement procedures would result in higher scores on all criteria than would any competing treatment. On variables C and D, the video-tape with reinforcement treatment did tend to have a significantly greater effect ($p < .10$) than did the pooled control treatment (cf. Table 3), but on only variable C was its effect superior to that of all other competing treatments. On variable D, video-tape with reinforcement as a strategy was second to the video-tape without reinforcement treatment in terms of greatest effect. In reality, no one treatment was shown to be superior irrespective of the criterion problem-solving behavior in question or of factors such as subject sex and the presence of social reinforcement. A study of Tables 3 and 8 shows that several different treatments were highly effective depending on the particular problem-solving behavior, the sex of the subject, and whether or not reinforcement procedures were included.

Effects of Reinforcement. Hypothesis two which postulated that treatments employing social reinforcement would always have greater effect than those without it was supported only by some data from variable A. Table 8 indicates that on this variable, the addition of reinforcement brought significantly ($p < .05$) more positive results. A trend ($p < .25$) toward such a result was also found on variable C. On most variables, the introduction of reinforcement procedures increased the effect of the video-tape and the written booklet treatments, but was often detrimental to the

effect of the audio-tape condition. Data from variable A revealed a sex x reinforcement interaction ($p < .10$) indicating that the positive effect of social reinforcement was largely felt among female subjects (cf. Table 8). Variables A and C were criteria of prime interest in the investigation, however, thus such data should be given considerable weight. Thus, treatments utilizing reinforcement proved superior, not, as was hypothesized, on all criteria but rather on those criteria quite closely related to the behavior for which the reinforcement was provided.

The Effect of Variations in Media. It was hypothesized that the order of media effectiveness would consistently be video-tape, audio-tape, and written booklet in order of decreasing effectiveness. Data from variable C provided some support for hypothesis three. The media effect ($p < .10$) found here was the result of video-tape treatments having a greater effect than audio-tape strategies, which in turn had a greater effect than written booklet approaches. A trend ($p < .25$) similar in nature was found in data from variable H. In the latter case, the finding was largely due to the high scores of male subjects in all treatment groups, whereas in the former case the result was attributable to the scores of both male and female subjects except in the case of the written booklet with reinforcement condition, where male subjects scored higher than did female subjects. Thus, on only two of nine dependent variables did video-tape, audio-tape and written booklet strategies tend toward the hypothesized order of effect. Therefore, the directional prediction of Hypothesis three was not supported.

Written Booklet vs. Audio-Tape. Written booklet and audio-tape strategies produced effects not significantly different from one another on each criterion. The effect of written booklet and audio-tape approaches appeared upon inspection to approach differences reaching the desired levels of statistical significance on a number of criteria. However, when standard

deviation statistics were taken into consideration such differences proved to be not significantly different. Examples of such instances can be found in Table 8 on variable C among males and on variable F among females exposed to strategies containing social reinforcement. Only on two variables, A and C, did the data indicate that the effects of the written booklet and audio-tape had different effects at, or less than, the 10 percent level. This was indicated by the main effect of media which reached the desired level of significance on variable C ($p < .10$) and in the reinforcement x media effect which reached a desired level of significance ($p < .10$) on variable A. Notwithstanding these two findings, the preponderance of evidence indicated that in the case of seven of the nine dependent variables, the two approaches, audio-tape and written booklet, produced effects not significantly different from one another.

Lecture vs. Baseline Control. The hypothesis asserting that the lecture treatment would possess greater effect than the baseline control treatment which involved exposing subjects to programmed statistics materials received no support. t-test procedures on each of eight variables resulted in no significant differences at the desired levels between the two groups (cf. Table 3). Chi-square data from variable E also indicated this lack of differences. The groups were subsequently combined into a pooled control group.

Summary of Support for Hypotheses. Of the five major hypotheses set forth prior to the investigation, none received substantial support. In contrast to the lack of support uncovered for the major hypotheses, a number of findings, primarily interactional in nature provided valuable information which will be discussed in the remainder of this chapter. In addition, these results have implications for the development of a training program for personal problem-solving behaviors, a topic which will be considered in Chapter IV.

Effects of Lecture and Baseline Control Groups. The lack of difference found between the results of subjects in the lecture and baseline control groups was not expected. An attempt has been made to provide a lecture having a wide variety of interesting oral examples and to utilize a dynamic forceful individual as lecturer. In contrast, the baseline control subjects dealt with written materials on descriptive statistics and it was expected that the mode and the content of these materials would lend themselves to measuring baseline pre-post changes in the subjects in terms of the criteria employed. A comparison finding equally unexpected was the fact that both the lecture approach and the programmed statistics strategy fared rather well in comparison with the competing treatments on most criteria. While several plausible explanations can be offered for the fact that the live lecture approach elicited results to those of the competing treatments, few can be offered for the quantity of problem-solving behavior manifested by subjects exposed to the programmed statistics materials.

It might be postulated that some features of the programmed materials were found stimulating, such as the programming format itself or the content of the materials which involved solving sample statistical problems drawn from the practical situations and answering questions related to these examples. It might also be possible that such a treatment heightened the subjects' sensitivity to a need for assistance in personal problem solving and that they subsequently were particularly prepared to "learn" during the criterion phase of the investigation. During the treatment session, several subjects in the group exposed to programmed statistics materials expressed their dissatisfaction with the materials to which they were exposed, saying that they did not feel the statistics exercises provided any help in personal problem solving. As a result, this treatment experience may have heightened the desire of such subjects for assistance, or in some other way increased

their receptivity to the criterion experiences which were most certainly relevant to personal problem solving. However since this condition functioned as a baseline control the criterion behaviors occurring among these subjects must be considered as the quantity normally occurring and no statement can be made regarding supposed effects of this treatment.

t-test Comparisons. Results of t-test procedures on variables B and D presented an important paradox. Data from variable B showed that subjects from the pooled control group expended a greater number of seconds viewing each slide they selected from the "alternative" category than did subjects in four of the six competing treatments. With regard to variable D, however, only subjects from the written booklet without reinforcement conditions spent a fewer number of seconds viewing each slide they selected from the "outcome" category than did individuals in the pooled control group. A plausible explanation can be advanced which would account for such apparently conflicting findings since the nature of the two categories of slides under consideration was different. With regard to the "alternative" slides, there were six slides involved and each one presented one possible solution to the hypothetical problem. In contrast, each of the 12 slides dealing with "outcomes" contained considerably more information and in a different form. In addition, "outcome" slides were of two types, possible positive and possible negative outcomes for each of the six alternative solutions; and each slide presented several possible outcomes possessing varying probabilities of occurrence. The outcomes and the subjective probability of occurrence of each alternative had to be weighed against each other and against possible consequences and probabilities presented in other slides. Further, each subject had to contrast outcome information against additional information available concerning the problem and the problem solver. One possible ramification of these differences between

the two slide categories might have been that the sophisticated well-trained problem solver tended to look at more "alternative" slides (but would give relatively little time to such slides) than did an individual with less training. This would be the case due to two reasons. He might have been able to process faster the small amount of information presented, consequently giving few seconds of attention to the short expository statements found on the "alternative" slides. A second possible ramification might have been that he tended to give longer consideration to each "outcome" slide he chose, because he had knowledge that information in this slide category involved the more sophisticated aspect of the problem-solving process, such as studying the possible positive and negative outcomes resulting from the implementation of these alternatives. In other words, it is postulated that he knew that it was the information about possible outcomes that made the difference in which alternative was chosen, not the simple statement presenting the various alternatives. Utilizing this line of reasoning, the t-test findings from variables B and D would be expected to occur and would present no paradox. An extended discussion of the data from these two variables has been attempted not primarily because the results of the variables were the reverse of one another but because the results obtained presented a rather unique paradox in terms of what might have logically been expected if this difference had been recognized before the study was initiated.

The lack of significant results on variable I may have been partially due to the criterion measurement phase of the investigation acting as a treatment in the case of the baseline control group. While the baseline control group received irrelevant materials during the treatment period, their experience of working in the simulated problem-solving situations may have contributed to the rapid formation of perceptions that they

were receiving assistance in problem solving. Subsequently, these subjects would also have made fewer requests for assistance at the end of the investigation than they had made earlier. This paralleled the tendency of subjects in most of the other treatment groups and resulted in no treatment being significantly more effective than any other in reducing the number of requests for problem-solving assistance. To a lesser degree, the possible confounding effect of criterion measure administration also might have applied to the results from variable H. Aside from all the problems inherent in self-report data, if such a measure is used in future research of a similar nature, it would be advisable to obtain a measure of change in self-reported behaviors prior to the administration of any criterion measures that might have a training impact on the subjects.

Chi-Square Analyses. The failure of data from variable E to provide any statistically significant findings might have been due to the weak way in which the criterion was structured. Each individual had a 50% opportunity for making an acceptable response. Adequate measurement of personal problem-solving behaviors must take into consideration the solutions or products of problem solving, but more rigor must be employed in such measures. This could be accomplished by manipulating the available information to make the specific alternative solutions scalable in appropriateness in order to get sufficient discriminative power to separate well-trained from less well-trained problem solvers. In its present form, this criterion showed no significant difference among the number of subjects in each treatment group who selected one of the acceptable solutions to the problem presented in the hypothetical problem simulation. It is assumed that such differences might have been revealed by a more sensitive instrument.

ANOVA Main Effects. The two largest F ratios in terms of reinforcement main effects resulted in data from variables A and C. Both of these variables involved some of the more simple problem-solving behaviors under investigation, (i.e., number of slides viewed from two categories). One possible explanation of such results is that reinforcement might have been substantially more effective in increasing the sheer number of rather simple responses but less valuable in producing more complex responses such as the time emphasis given to certain types of slide. Perhaps an even more likely explanation is the fact that in the reinforcement procedures, each subject was asked whether or not the social model should review additional alternatives. If a subject responded in the affirmative, then social reinforcement was provided. Since the reinforcement was provided in a manner directly connected with reviewing more alternatives, it should have been anticipated that its biggest effect would have been on this criterion behavior. Further, the most logical area of generalization for such an effect would have been on a similar behavior like the one involved in variable C. The results relative to variables A and C in Table 9 are clearly accounted for by such an explanation. In future efforts when an increased effect due to reinforcement is desired, it may well be that more of a direct connection must be made between the reinforcement and each specific behavior reinforced.

On the topic of media main effects, the media in this investigation were not only parallel or comparable but tightly dependent on one another. The audio-tape and written booklets were actually sound track replicas of the video-tape. Such an interrelationship could have worked to the disadvantage of the media. Of course, numerous improvements could have been made in the video-tape and it could be argued that it was in and of itself weak in its potential effect. However, equally plausible is the postulate that the audio-tape and written booklet approaches were handicapped by

having to conform unerringly to the content of the video-tape. Scores on media might have been just as comparable even if they had differed in content. In fact, to make the media as strictly parallel as was done in this investigation may have ignored some of the individual strengths of the media in question and actually blunted their effectiveness, causing a leveling effect across media. Designing the most effective written booklet, for example, might not involve simply typing a verbatim script of a video-tape production. Thus, the one F ratio reaching a desired level of significance (i.e., on variable C) might have been in spite of the blunted effects of the media rather than because of their individual differences in effectiveness. If the above explanations are valid, they might also explain the lack of F ratios reaching desired levels of significance relative to the main effect of sex.

ANOVA Interactions. The consistent lack of F ratios at the desired levels of significance relative to the factor of sex was also evident on the interaction data portrayed in Table 9. Of 16 possible interactions involving subjects' sex, only one, a sex x media interaction on variable H reached a desired level of significance ($p < .10$). The explanation most strongly suggested by the data is that sex is indeed not a learner characteristic that has a significant impact on the training of these behaviors. However, it also seems possible that sex effects did indeed exist but were masked by some of the confounding factors discussed earlier with regard to main effects.

It must be pointed out that the interaction on variable H which did attain a desired level of significance could well have been the result of chance factors. If such chance probabilities are ignored, a study of the nature of the interaction makes another inference plausible. It may have been possible that among males the dramatic nature of the video-tape and

audio-tape presentations influenced subjects' self-reporting of problem-solving behaviors. In data from both the with and without social reinforcement conditions, the order of media effect among males was clearly videotape, audio-tape and lastly, written booklet. On this variable at least, it seemed to support the notion that dramatic and audio-visual stimulation is necessary to hold the attention and interest of male subjects, possibly because of the aversiveness reading may have for many of them. Without social reinforcement, the order of media effect was completely reversed from that among males, and the addition of reinforcement did not fully bring that order of effect into line with that found among male subjects. The finding that the written booklet was a much more powerful approach with females would support the notion that girls are more likely to react favorably to written material and do not need the rather dynamic approach which seemed to be more effective with boys. It could further be argued that variable H was closest to students' real-life problem-solving performance than any of the other criteria derived from simulations. Thus the results on this variable would have particular importance.

The second order interaction associated with variable H was very difficult to interpret. Without the visual component in the presentation, the females seemed to respond better without reinforcement being added to the treatment. Only reasoned speculation can be offered as a tool for discovering possible causes of such a result. The above second order interaction may have been the result of a negative reaction to interruptions in the presentation. Such results also could have been due to sex differences in attention span or the degree of identification elicited by the listening and reading approaches. For example, female subjects may have been more used to reading stories about people of their own age. Also, while they perhaps were more used to interruptions in a visual presentation, because of their

experiences viewing television commercials, female subjects may have experienced more resentment toward the interruptions occasioned by reinforcement procedures injected throughout the listening or reading experiences.

Similar difficulties in interpretation surrounded the other second order interaction found in Table 9. On variable G the introduction of reinforcement was positive in the case of video-tape among males, and the same addition to video-tape brought about a decrease in effect among females. No plausible explanation can be offered for these results at present. Variable G dealt with the pattern of information selection in the Personal Problem Simulation and points were awarded in this criterion on the basis of both the number of alternatives about which some information was selected and the amount of information investigated about each selected alternative (cf. Appendix K). It seems possible that the giving of reinforcement to subjects for verbally stating that the social model should consider more alternatives was effecting in a rather oblique manner the pattern of information selection being made by subjects in the Personal Problem Situation. This effect, whatever its precise nature, was rather consistent but was reversed between the sexes (cf. Table 8).

The final interaction to be accounted for appeared in data from variable A. The written booklet clearly benefitted more than did any other treatment from the addition of social reinforcement procedures. This same effect was noted to a lesser extent in several other instances, especially on variable C. Such results could well have been due to benefits resulting from the breaking up of extensive written material with pauses and brief changes of activity. Under such conditions any negative reactions subjects might have had to extended reading activities might have been minimized.

Additional Potential Influences upon Results. The possibility that the nature and content of some criteria used in the investigation exerted a confounding effect upon the results has been noted earlier. In addition, other factors associated with the study may have contributed to the specific results obtained. For example, the necessity of administering all criterion measures in a single session may have affected the responses of subjects. Particularly when simulations were included, the level and length of concentrated effort which was required of each subject might have resulted in boredom, random or negative responses. This concentration of criterion administration might have introduced a leveling or equalizing effect across treatment conditions which would mask the superiority of a particular treatment. Perhaps an additional plausible postulate for artificial changes in problem-solving behaviors was that some subjects increased their effectiveness due to the freshness of the concepts and material presented as part of the criteria and due to transfer of learning from one criterion task to another. At the same time, the performance of other students might have deteriorated due to fatigue or loss of interest. The latter effect might have been particularly true of bright subjects who grasped the concepts and behaviors early in the training experiences and who viewed much of the subsequent training and criterion experiences as redundant and boring. Another possible factor confounding the results for the control subjects is one that was noted earlier. Many of these subjects might have perceived during the criterion phases of the investigation that they were finally getting the help they requested and were through with what appeared to be the boring materials given to them during the training itself.

One element (i.e., the script) was held in common by six of the treatment strategies. It might have been that the script itself was inadequate from the standpoint of clarity or interest stimulation. This "weak link" in the treatment "chain" might have made a significant contribution to a sparseness of significant results at the desired levels. Other possible limitations in this study might have been that inappropriate criteria were selected for the problem-solving skill areas of concern or the criterion instruments employed might have been inadequate in their sensitivity to the incidence of the specific behaviors related to the selected criteria. Table 10 reports the intercorrelations among all the criterion measures employed in the study. While possible issue of whether or not the most appropriate criterion measures were formulated and employed is a question for further investigation, an intercorrelation matrix of all nine dependent variables revealed that the variables were indeed for the most part measuring different things. The highest intercorrelation between variables is found between the number of slides presenting possible outcomes of alternative solutions which were viewed by the subject (variable C) and the relation between the number of seconds spent viewing such slides and the total number of seconds spent viewing slides of any kind. The prime contributor here is of course that in most cases the greater number of "outcome" slides watched by the subject, the greater amount of his total viewing time was spent viewing outcomes. This is then a natural relationship between these two variables. Much the same can be said of the .712 correlation between the two parallel criterion measures concerning alternative solutions in the Hypothetical Problem Simulation, (variables A and B). Some outcomes of criterion measures have already been noted and suggestions for improvements in them and in the statistical procedures employed will be made in Chapter IV.

Table 10

Intercorrelations of Nine Dependent Variables

Dependent Variable	A	B	C	D	E	F	G	H	I
A. Number of viewed slides presenting a possible alternative problem solution.	1.000	.712	.590	.483	.156	.096	.040	.147	.059
B. Time given to slides presenting alternatives in relation to total time viewing all slides.	.712	1.000	.118	.172	.108	.168	.069	-.020	.025
C. Number of viewed slides presenting information on the possible outcomes associated with the implementation of particular alternatives.	.590	.118	1.000	.870	.092	.022	.026	.085	.026
D. Time given to slides presenting information on the possible outcomes of alternatives in relation to total time viewing all slides.	.483	.172	.870	1.000	.067	.016	.020	.052	.025
E. Rated appropriateness of the alternative selected as "best."	.156	.108	.092	.067	1.000	-.062	-.088	-.054	.001
F. Number of hypothetical individuals (i.e., alternatives) about whom some information was selected.	.096	.168	.022	.016	-.062	1.000	.814	.287	.198
G. Rated efficiency of information packet selections within and across hypothetical individuals (i.e., alternatives).	.040	.069	.025	.020	-.038	.814	1.000	.267	.143
H. Net increase (i.e., pre- and post-treatment) in each subject's self-reports of desirable personal problem-solving behaviors.	.147	-.020	.085	.052	-.054	.287	.267	1.000	.502
I. Net decrease (i.e., pre- and post-treatment) in the number of written requests for assistance with personal problem-solving behaviors.	.059	-.025	.026	.025	.001	.198	.143	.502	1.000

Only two other intercorrelations indicate more than 25% of the variance in scores on any two variables being held in common by these variables. One of these, a .59 intercorrelation, indicates an association between the number of "outcome" slides and the number of "alternative" slides viewed by each subject. The other such intercorrelation (.50), indicates that the criterion measure assessing the changes in the self-reported problem-solving behavior of each subject and that measure assessing the change in the number of written requests for problem-solving assistance made by each subject, (variables H and I), may to some degree be measuring the same things. This correlation is probably due to the fact that certain types of responses to some of the statements on the Checklist for Solving Problems in Real Life were used in the formulation of both criterion measures. Despite the particular intercorrelations discussed above, it appears that each of the dependent variables does measure a separate phenomenon. It should be noted that no test-retest reliability estimates are at present available, however. Some outcomes of criterion measures have already been noted and suggestions for improvements in them and in the statistical procedures employed will be made in Chapter IV.

An attempt has been made in this chapter to present a concise review of the results obtained in this investigation including their relationship to the hypotheses proposed prior to the study. Subsequently, several plausible explanations for, and factors influencing, these results have been discussed. Chapter IV in addition to summarizing the investigation will focus on conclusions and implications which might be drawn from these results.

IV. SUMMARY, CONCLUSIONS, AND IMPLICATIONS

Summary

Problem

Problem situations (i.e., those situations in which the appropriate or optimal response is not immediately obvious) are frequent and recurrent throughout life. A wide variety of events, internal and external to the individual, have been hypothesized to occur when a person faces such situations. Until the past decade relatively little consistent or programmatic effort was expended in thorough exploration of problem-solving behavior. From a historical perspective, Gestalt psychology, the psychometric movement, research in human learning, and information processing theory including work in computer simulation have been major influences upon both the theorizing and research carried out in relation to human problem solving.

Guidance has often been viewed as having a major responsibility in American education for assisting young people to be effective personal problem solvers. Guidance programs have been charged with this responsibility primarily due to inferential evidence which has implied that adverse effects befall people with inadequate problem-solving skills, especially in a rapidly changing, cognitively complex society such as our own where the quantity and difficulty level of the real-life problems confronting most individuals have rapidly increased. However, the abundance of previous research in human problem solving has been predominantly laboratory-oriented and has dealt primarily with problems far removed from the real-life choice situations of daily life. In addition, and perhaps not unrelated

to this research deficit, is the fact that a study of guidance-oriented research suggests that there has been inadequate progress toward the priority goal of guidance, assisting individuals to become effective personal-problem solvers.

Rationale and Strategy

Substantial evidence can be marshalled to support the notion that human problem-solving behavior is learned and is, therefore, subject to modification through training. Since the prime interest in this study was the development of techniques for training individuals to utilize effective problem-solving behaviors, the initial strategy was to study available models of problem-solving behaviors in order to ascertain what behaviors were involved in the process and to examine attempts to train these or similar behaviors. Such an investigation revealed six rather basic skill areas related to problem solving in real life, each of which was composed of several more specific behaviors. Previous efforts to train these and similar behaviors seemed to focus on educational and vocational decisions to the virtual exclusion of other life areas. Evaluative data on the effectiveness of the efforts were rare; they lacked clear objectives, specific facilitative learning experiences and criterion measures directly related to their objectives. Individual research studies proved somewhat more useful in producing specific problem-solving behaviors. Clues were gleaned from such studies which provided indication of what psychological and physical factors effect human problem solving and what might be some potential training strategies worth exploring. Representative examples of such strategies involved social modeling, the use of reinforcement, and direct exhortative approaches. The research in this area of investigation,

however, was anything but systematic and research findings were isolated and often apparently unrelated to one another. The necessity of measuring problem-solving behavior has brought about great controversy, with the controversy revolving around a product vs. process dichotomy. Some researchers suggested that it was the solution arrived at, or whether or not the solution worked, that determined the quality level of the problem-solving skill; while others stoutly maintained that it was the process that was of importance, not the chosen solution or the ultimate results of problem solving. The few available instruments designed to measure problem-solving behaviors reflected this controversy. They tended to weight the problem solution selected by subjects as more important than the process subjects used in selecting a solution, though attention was sometimes given to one or two process behaviors. No available instruments came very near to assessing both how individuals dealt with problems in their own lives and the nature of the problem solutions. However, it was accepted as a basic premise in this study's rationale that an adequate measure of real-life problem-solving behaviors must concern itself with both process and product.

Design

A problem-solving skill postulated to be of key importance (i.e., the consideration of alternative problem solutions prior to making a decision) was selected for an exploratory investigation aimed at providing direction for optimal training strategies for a proposed problem-solving training program. Specific questions under investigation included: (1) Which medium of presentation (video-tape, audio-tape, or booklet) is the most effective? (2) Does the addition of social reinforcement procedures during training heighten the effectiveness of a treatment regardless of the medium employed?

(3) Is there a differential effect of particular treatments dependent on the sex of the subject being trained? Eight treatment groups were formulated including video-tape social modeling, audio-tape social modeling, and a modeling strategy utilizing written booklets. Three treatments parallel to these except that they incorporated social reinforcement of desirable subject verbal statements during training were also employed. In addition, there was a condition in which subjects received a live lecture on the topic and a control treatment in which subjects were exposed to programmed materials on descriptive statistics.

Criteria

A total of three criterion devices yielding nine criteria were derived from two problem-solving simulations and a self-assessment device. In the first of these simulations, the subject's task was to assist a hypothetical individual to solve a real-life problem. Information concerning the problem, the problem-solver, alternative courses of action that could be taken, and the possible outcomes of implementing the various alternatives were available on 35mm slides. For 10 minutes subjects were free to view whatever they felt would be the most useful slides for solving the problem. At the end of that time, they were asked to indicate which alternative course of action they felt the hypothetical character should take. In the second simulation each subject was given the task of selecting one of a number of available individuals to assist him in solving a current life problem of his own choosing. Information on these hypothetical individuals was made available through photographs and tape cartridges placed in information packets. Subjects were faced with a 10-minute limitation. Subjects were asked at the conclusion of that time to indicate which individual they had chosen to assist them. Following this simulation each subject filled out the self-report device noted earlier. Criteria derived from the first simulation in which each subject assisted a hypothetical person to solve a personal problem

included: (A) the number of slides viewed by the subject presenting alternative problem solutions, (B) the time given to slides presenting alternatives in relation to the total time viewing all slides, (C) the number of slides viewed by the subject which presented information on the possible outcomes of implementing various alternatives, (D) the time given to slides presenting possible outcomes of alternatives in relation to the total time viewing all slides and, (E) the rated appropriateness of the solution selected as "best," (the available information was manipulated in such a manner as to make three of the six possible alternatives quite acceptable).

From a second problem-solving simulation in which each subject was to select an individual to assist him in solving a personal problem of the subject's choice two more criteria were derived. The criteria were (F) the number of alternative individuals about whom some information was selected and (G) a measure of the amount of information on each alternative which was considered. Finally, two further criteria came from a readministration of a self-evaluative problem-solving behavior assessment device. These criteria were (H) positive changes in self-reported problem-solving behaviors and (I) net decrease in the number of written requests for problem-solving training.

Hypotheses

1. Subjects assigned to the video-tape with reinforcement treatment will score higher on the criteria than will subjects assigned to any other treatment condition.
2. Subjects assigned to the three treatment conditions involving social reinforcement will score higher on the criteria than will subjects exposed to similar conditions not involving social reinforcement.

3. Subjects assigned to the two video-tape treatment conditions will score higher on the criteria than will subjects assigned to the two treatments involving written booklets or to the two treatments involving audio-tape, or to a treatment involving an oral lecture, or to the baseline control condition.
4. Subjects assigned to the two audio-tape treatment conditions will score no differently on the criteria than will subjects assigned to the two treatments involving written booklets.
5. Subjects assigned to the oral lecture treatment condition will score higher on the criteria than will subjects assigned to the baseline control treatment.

No interactions between media, the use of reinforcement, and the sex of subjects were hypothesized.

Experimental Procedures

In a suburban San Francisco Bay Area high school, all eleventh graders responding positively to a device designed to assess their need and desire for problem-solving training formed a pool from which 128 students were randomly assigned by sex to one of the eight treatment conditions noted earlier. Convening in separate rooms within the high school counseling suite at various times during a four-day period, each group received the same opening and closing remarks prior to, and after, the administration of its treatment procedure. Approximately one week following completion of treatment administration, collection of criterion data was begun. Students were summoned individually on a random basis and were exposed to all three criterion measures within a 30-minute period. This phase of the investigation consumed a total of eight school days. The problem-solving simulations were followed by second administration of the Checklist for

Solving Problems in Real Life. In the first of these simulations, the subject's task was to assist a hypothetical individual to solve a real-life problem. Information concerning the problem, the problem-solver, alternative courses of action that could be taken, and the possible outcomes of implementing the various alternatives was available on 35mm slides. For 10 minutes subjects were free to view whatever they felt would be the most useful slides for solving the problem. At the end of that time, they were asked to indicate which alternative course of action they felt the hypothetical character should take. In the second simulation, each subject was given the task of selecting one of a number of available individuals to assist him in solving a current life problem of his own choosing. Information on these hypothetical individuals was made available through photographs and tape cartridges placed in information packets. Subjects were faced with a 10-minute limitation. Subjects were asked at the conclusion of that time to indicate which individual they had chosen to assist them. Following this simulation, each subject filled out the self-report device noted above.

Data Analysis and Results

BMD 07D was run initially in order to secure a check on the accuracy of the data recorded. This program provided, in addition to means and standard deviations, histograms and ranges for each treatment group of each criterion measure as well as a one-way analysis of variance on each criterion. Subsequent to this preliminary analysis, due to the dicotomous distribution of data on variable E, these results were dealt with separately via chi-square techniques. t-test procedures were employed to compare the effects of the lecture group and the baseline group on each of the remaining measures.

Since no significant differences on any of the criteria appeared between these two types of control groups, a "pooled" control group composed of these two treatment conditions was used. Analyses included a comparison of mean effects of the pooled control with those of each of the remaining treatments on each criterion measure through further t-tests. Finally, three-way (sex x reinforcement x media) analyses of variance which sought to uncover significant main effects and interactions involving these three factors were conducted on data from all treatments except the pooled control.

Even when desired levels of significance were set at $p < .10$ and $p < .05$, results produced little support for the five hypotheses. Regarding hypothesis one, (i.e., that subjects assigned to the video-tape treatment will score higher in the criteria than those assigned to any other treatment), on only two of the nine criteria was any support obtained, though one of the measures (i.e., the number of slides viewed by the subject which presented the possible outcomes associated with various alternatives), on which some support was indicated was one of the criteria of prime concern in the study. Somewhat more supportive evidence was uncovered with respect to hypothesis two, (i.e., that subjects assigned to treatments employing social reinforcement procedures would score higher on the criteria than would subjects in similar treatments not employing social reinforcement). On data from the prime criterion of interest, the number of "alternative" slides viewed by the subjects in the first problem-solving simulation, this hypothesis was supported at the $p < .10$ level of significance. On one other measure, the number of "outcome" slides viewed, a strong trend ($p < .25$) in the predicted direction on two criterion measures, (i.e., the number of slides viewed by a subject which presented information on the possible outcomes associated with each alternative and positive changes reported in personal problem-solving behaviors), was uncovered. Though inspection of the data relative to hypothesis four revealed what appeared to be differences of considerable

magnitude, on only one variable, (i.e., the number of slides viewed by the subject which presented possible outcomes associated with each alternative, did the difference reach a desired level of significance. Finally, t-test procedures comparing the live lecture strategy with the baseline control group provided no support for hypothesis five. Though on a majority of criteria the lecture group appeared to be superior, these differences at no time reached the desired levels of statistical significance.

Contrary to what was hypothesized, this study's major findings of significance concerned first and second order interaction effects. On a criterion of major interest, (i.e., the number of slides viewed by the subject which presented alternative problem solutions), a reinforcement x media interaction was uncovered. Higher criterion scores among subjects in written booklet treatment groups when social reinforcement was introduced was the primary element here. The apparently greater effectiveness of the video-tape strategy for males in contrast to females and a similar effect for the written booklet for females in contrast to males contributed to a significant media x sex interaction on variable H, (i.e., the positive changes in self-reported personal problem-solving behavior). Two second-order interaction effects of a similar nature and at desired levels of significance were found. In regard to variable G, (i.e., the rated efficiency of information packet selections within and across alternatives), when reinforcement was added to each medium of training, reversed effects resulted dependent upon sex. For males, video-tape and written booklet seemed more effective without reinforcement, whereas audio-tape was more effective with reinforcement. Opposite effects were noted among females. Finally, opposite effects were also found dependent on sex when reinforcement was added to each media on variable H, (i.e., positive changes in self-reported personal problem-solving behavior). For males, reinforcement resulted in lower scores within the context of a video-tape strategy, and a positive effect in the case of

participatory responses. Several studies (e.g., Maccoby, Michael and Levine, 1961; Michael and Maccoby, 1961) have consistently found that immediate reinforcement of these responses had a positive effect upon student performance even when the responses were covert. Therefore, in seeking a powerful treatment to train any particular problem-solving behavior, it was postulated that the factors of requesting overt responses from the subjects and subsequently reinforcing those responses which are correct could be paired effectively with modeling strategies.

Media. The use of video-tape has been encouraged by several leaders in the guidance profession (Wrenn, 1962; Magoon, 1964). Major advantages to this medium are a reproducible sequence of events generated at relatively low cost, and the ease with which competing media such as audio-tape and written booklets can be made comparable in content. However, when compared to audio-tape and written materials, video-tape becomes an elaborate and expensive medium for experimentation in the schools, so strategies relying on audio-tape and written booklets need to be explored as well. While the lecture method has frequently proven less adequate than other methods of teaching (e.g., Lewis, 1964) or only as adequate (e.g., Ulrich and Pray, 1965), it remains a dominant approach in both secondary and higher education. However, the preponderance of research has tested the effectiveness of lecture through information recall based on paper-and-pencil tests rather than through overt performance of some complex behavior. In spite of this fact, it was decided that a traditional live lecture strategy, not just audio and video-tape strategies, and booklet presentations, should be given ample opportunity to demonstrate its usefulness for a comprehensive training program of problem-solving behaviors.

Chapter Summary

The guidance profession has set as one of its major goals assisting individuals to solve personal problems wisely. Several theoretical and research traditions have contributed to the current degree of knowledge held concerning personal problem solving, but each, by itself, is inadequate as either a total explanation of the relevant phenomena or as a model of successful research strategies for the training of effective problem solvers. It seems most productive at this juncture to attempt directly the training of overt behaviors which are postulated to be requisite to the wise solution of real-life problems rather than to engage in attempts at less direct interventions such as the influencing of thought processes or mental skills. The lack of research studies dealing with differentiation on a behavioral basis of effective and ineffective problem solvers, however, necessitates that the behaviors thought to be requisite to effective personal problem solving be inferred from a study of available problem-solving descriptions and paradigms. Previous attempts at training effective problem-solvers as well as related independent research investigations yield a number of insights as to needed improvements in real-life problem-solving research. There must be clear and specific training objectives which indicate what those being trained will be able to do when the training has been completed. An acceptable training effort must also encourage transfer of what is learned to a wide variety of real-life problem situations. Additionally, research must focus on personal characteristics which may influence the effectiveness of various training strategies rather than upon psychological traits which are thought to be associated with some unitary construct of problem-solving

ability. Improved techniques for both accurate and sensitive measurement of both the process and product of problem-solving are needed. In this manner any behaviors which are truly requisite to effective personal problem solving may be validated and the issue of exactly what procedures result in what changes in which subjects can be clarified.

The research outlined in the remainder of this report was an initial investigation aimed at bringing about some of the improvements noted above preliminary to the development of a personal problem-solving training program. It attempted to explore potentially useful training strategies and the influence of an important subject characteristic upon the training of what was postulated to be a key behavioral area in the personal problem-solving process. The specific behaviors investigated as well as the design and procedures employed in the study are discussed in Chapter II.

II. EXPERIMENTAL DESIGN AND PROCEDURES

Skill Area To Be Investigated

The problem-solving skill area that has been chosen for initial study is the generation and consideration of several alternative solutions or courses of action prior to selecting one alternative for implementation. A specification of the behaviors that could be appropriately included in this selected skill area is found on page 22. Previous research relative to this skill area has been primarily concerned with assisting individuals to generate increased numbers of alternatives usually through being trained to produce a number of different responses when they were confronted with the same recurring stimulus. Such a task probably has little personal relevance to each individual. Only the Evans and Cody (1969) study cited earlier included a concern for training an individual to consider several relevant alternatives before making a decision in contrast to merely generating several alternatives. And the experimental task involved something akin to real-life problems.

There is a distinction, therefore, between the concepts of "generating" and "considering" alternatives. In personal problem-solving contexts, it does little if any good to produce possible solutions if (in reality) they are never considered before an alternative is chosen. This investigation will focus upon increasing the quantity and quality of consideration given by subjects to alternative solutions which are provided. The word "considered" is used to indicate that attention is given to each alternative and that the possible outcomes of each are explored. In effect, the individual spends time studying each alternative in some

depth before discarding or accepting it. Even if he can generate alternatives in response to a particular stimulus, he also must be sufficiently open to consider these alternatives, regardless of whether or not they are provided for him by outside sources. The effective problem-solver might well show greater latency in responding though the use of a simple time criterion has been cautioned against earlier.

The main rationale for the selection of this skill lies in its effect upon the whole problem-solving process. A growing body of literature on post-decision dissonance seems to indicate that if one focuses on one possible alternative solution to a problem subsequent to the actual decision, it becomes more difficult to examine information conflicting with the alternative chosen, and similarly more difficult to examine objectively the outcomes of whatever solution is chosen (Brehm and Cohn, 1962). Thus, without the consideration of several relevant alternatives, the problem-solving process is curtailed. In contrast, the individual who sets out to consider several alternatives before selecting one is more likely to be open to incoming information, to utilize that information, to generate further alternatives, and to have a better framework for sorting relevant from irrelevant information concerning these alternatives.

Two further advantages for individuals having proficiency in this skill area exist. First, it seems logical that the consideration of several alternatives increases the probability of selecting a successful (i.e., one producing outcomes most personally satisfying to the individual) alternative. Second, it is likely that a second choice alternative will be available so that it can be adopted as a backup plan to be employed in

case the implementation of the individual's first choice is in some way frustrated.

What kind of experiences would maximize the probability that an individual would consider more than one alternative solution when he was confronted with a personal problem? The purpose of this research was to assess the differential effects of various training strategies upon high school students' reported and actual instances of considering multiple alternatives. The differential effects of three major audio-visual media (video-tape, audio-tape, and booklet) were to be examined as were the effects of combining each of these media with overt participation and social reinforcement of desirable responses. Any interactions existing between these treatment factors and the sex of the subject were also to be assessed.

Experimental Design

Subjects. A device developed especially for the present study, a copy of which appears as Appendix I, was administered to 285 eleventh-graders at a San Francisco Bay Area secondary school located in a low and middle income community. Items were constructed so as to assess the students' need for training in problem-solving behaviors (e.g., I often make a decision without considering several possible solutions to a problem). As part of the same device, the students were asked if they would be interested in learning how to solve problems more effectively. As can be noted from a study of Appendix I, the ten statements which deal with the subjects current problem-solving behavior are to some degree counterbalanced as to direction. A response of "true" to statements #1, #3, #6 and #10, and a "false" response to items #2, #4, #5,

#7, #8 and #9 indicate that the subject is currently performing a desirable personal problem-solving behavior. All respondents who indicated that they did not usually consider many different solutions when solving a problem and who responded positively to either item #11 or #12 were placed in a pool of potential subjects. Secondly, any student whose responses indicated that he did not usually exhibit at least three of the desirable problem-solving behaviors and who responded positively to either item #1 or #2 were added to the subject pool. Lastly, subjects showing either of the above patterns of responses but who did not respond favorably to statements #11 and #12 were added to make a total of 175 students in the pool. Only approximately 25 students, however, were gleaned from this last procedure. From this subject pool, 128 students were randomly selected and assigned, equally divided as to sex, to one of eight treatment conditions. The remaining members of the subject pool were designated as alternates.

Treatments

1. Video-tape model without reinforcement. After receiving the standardized introductory remarks from an experimental assistant, this treatment group viewed a video-tape illustrating a male model whose age corresponded to that of students in the eleventh grade, and who confronted and solved a problem in his own life. The problem of how to spend a summer vacation was chosen since it was thought to be representative of those faced by secondary school students. The video-tape was predominantly concerned with the model's attempts to consider several alternatives before he selected and implemented a solution. Subsequently, the model experienced pleasant consequences as a result of the alternative he chose.

As he worked on solving the problem the model's comments emphasized and made clear the importance of the behaviors under investigation, how to perform the behaviors, and the results of doing so. Other characters in the video-tape provided examples of inappropriate responses to a similar problem situation. A copy of the script of this video-tape, which was produced with the assistance of the San Jose Unified School District in California, appears as Appendix B.

2. Audio-tape model without reinforcement. These subjects were exposed to a tape recording of the sound track from the video-tape. Thus the desired verbal behaviors were modeled for them but without the visual dimension.

3. Written model without reinforcement. A type script of the sound track from the video-tape was presented to this treatment group. The dialogue was preserved and thus the students were still exposed to a demonstration of the desired behaviors though action and sound elements found in the video-tapes were not present.

4. Video-tape model with reinforcement. Once again, the video-tape used in Treatment 1 was presented. However, at selected points the tape was stopped. During each pause, each subject was asked by the experimental assistant if he felt the model should now make a decision. If an individual indicated that he felt the model should not make a decision and should consider additional alternatives, the experimenter reinforced the subject socially through making a positive verbal statement as he recorded the subject's response. Each experimental assistant was provided with a list of verbal statements which were appropriate for use

in this context. These appear as part of the "Instructions to Experimental Assistants" in Appendix A. Each subject received three opportunities for reinforcement and the reinforcement was always administered in the presence of other subjects in that treatment condition. The subjects in each condition involving social reinforcement were always asked questions in the same order. The responses of each subject to these questions were recorded but were not used in data analyses. As reported earlier, the reinforcement treatment procedure added approximately ten minutes to a treatment session.

5. Audio-tape model with reinforcement. The same procedures were followed as are outlined in Treatment 4 with the soundtrack from the video-tape rather than the video-tape itself being utilized.

6. Written model with reinforcement. Derived from the video-tape, the typescript in booklet form was again used. When each subject reached selected typescript points equivalent to the corresponding points in the video-tape, he was instructed in the text to stop reading momentarily. When all subjects had reached the "stop" instructions, the reinforcement procedures outlined in Treatment 4 were employed.

7. Oral lecture. A direct didactic approach to developing the problem-solving behaviors under investigation was used in this treatment condition. Subjects were seated in a classroom and received an introduction describing the purpose of the meeting followed by a 25 to 30 minute prepared lecture using vocabulary appropriate to the eleventh-grade level, and stressing the importance of solving personal problems wisely and elaborating on the importance of considering several alternatives

before choosing a solution. A copy of this script is contained in Appendix C. The danger of considering too many alternatives and thereby not making a decision is mentioned. The effect of this problem-solving skill area on other skill areas in the decision-making process was highlighted and examples of consequences resulting from exhibiting this behavior were used. Several suggestions as to what students should do in order to start manifesting effective behaviors in this area were included. This treatment provided the fourth main medium studied here.

8. Control. A final group of subjects received the same introductory and concluding remarks from an experimental assistant but were not exposed to any materials relevant to the solving of personal problems. Instead, they responded for 30 minutes to written materials (i.e., programmed instructions in statistics) which had no apparent relation to personal problem solving. The assistant was instructed to avoid answering any additional questions or to reply that she did not have the answer to the question.

Criterion Instruments and Measures. From three criterion instruments, a total of nine criterion measures were developed to serve as dependent variables. Seven of that number were derived from two simulated problem-solving situations which were individually administered to subjects. The first of these situations assessed each subject's performance of the desired problem-solving behaviors by using a situation in which each subject was asked to assist a hypothetical problem solver with a personal problem. The second simulation assessed manifestation of the desired behaviors by having each subject select a personal problem of

his own and subsequently select a person to help him resolve that problem.

These two simulation criterion instruments embodied at least two advantages. First, the problem situations to which subjects were exposed were standardized, and second, the problems utilized were indeed of a real-life type. The second simulation had an additional advantage in that the problem situation was somewhat individualized in that the subject selected an individual to assist him with one of his own personal problems. Behaviors exhibited in these simulations were objectively quantifiable and thus amenable to statistical analysis. By utilizing situational assessment procedures, the probability of assessing the quantity and quality of the consideration given to alternative problem solutions was substantially increased. While it may be argued that the amount of time available to subjects in both situations should have been unlimited, real-life problem situations seldom have such temporal freedom. The time limits established should not have been too restrictive, it is true, but preliminary field testing indicated that within a ten minute period most of the information available in each simulation could be secured.

The three criterion instruments and their respective criterion measures are described in the following sections. Since both simulated situations involved equipment usage, each subject was provided with a written instruction sheet and a demonstration of any behaviors necessary for participation (e.g., operating the slide or tape equipment). The assistant was instructed to require each student to exhibit these behaviors before the criterion period began.

1. Hypothetical Problem Situation. Seated in a semi-darkened room, each subject was given verbal instructions with an identical written

instruction sheet and a program describing briefly 32 slides which were available in envelopes on a nearby table. This "Instruction Sheet and Slide Program" appears as Appendix D. Each subject was informed that when the projector was switched on he would be confronted with a description of a problem situation facing a hypothetical student, Jerry, and that he would be allotted ten minutes to decide on a solution to Jerry's problem. In order to assist him in arriving at a decision, he was informed that his "Instruction Sheet and Slide Program" described a number of slides providing information which might be useful in arriving at a solution to Jerry's problem. The slides were placed in categories and each presented a statement describing the interests, abilities, values and background experiences of the hypothetical problem solver; available activities in which Jerry could participate, several alternative courses of action that could be taken; and several consequences that could result from each alternative action. Each category of slides was placed in a separate envelope. A complete set of the slide captions can be found in Appendix E.

Each subject was allowed to select as many slides, and in any order, as he wished. The form used by the observer in collecting data from this criterion measure is found in Appendix F. All slides were placed in envelopes on a nearby table. Subjects were allowed to utilize as much of the ten minutes as they needed. However, they were informed that they must remain in the testing room for the entire ten-minute period allotted for solving the problem. In the event that a subject wished to turn his attention away from the problem-solving task for a portion of the allotted time, alternate activities (i.e., reading materials of interest to students of this age group) were provided in the testing room.

From the first criterion device, the Hypothetical Problem Situation, the number of slides presenting a possible solution to the problem viewed by the subject was accepted as an indication of the number of alternatives to which he gave some consideration. A second criterion measure from this instrument was a measure of the emphasis or degree of attention given by a subject to slides in the "alternative" category. For each subject, a ratio was formed with the number of seconds spent viewing alternative slides as the numerator and the total number of seconds spent viewing alternative slides as the denominator. This ratio was formed since a simple tally of the number of seconds during which "alternative" slides were viewed would make it possible for an individual who had viewed only one "alternative" slide for a large number of seconds to score high on this criterion measure. This ratio was then multiplied by the number of alternative slides viewed in order to weight appropriately the consideration of an optimal number of alternatives. Another, perhaps more sophisticated, problem-solving behavior within the skill area of considering multiple alternatives is studying the possible consequences of each alternative. In order to approximate an assessment of the extra effort that is necessary in real-life in order to learn the possible outcomes of implementing a particular alternative course of action, the slides providing this information for each alternative were packaged separately from the slide actually presenting the specific alternative problem solution. Thus, by receiving the "alternative" slide found inside each information envelope, each subject learned about a specific alternative problem solution to the problem, but he had to open at least one other package within the same information envelope in order to learn about the possible outcomes

associated with the implementation of that alternative. While it could be argued that the nature of this criterion measure would be highly correlated with and thus compound the results from criterion C above, such an argument would have to proceed from empirical data since a high correlation between the two criterion measures is not evident prima facie. Since "alternative" slides and "outcome" slides were wrapped separately, each subject could select neither type, one or the other type, or both types from the envelope. That is, entering the envelope for one type of slide did not necessitate viewing the second type of slide. However, to further examine this issue among others, a complete matrix of correlations between dependent variables is reported subsequently as Table 10. The number of slides viewed from the "outcome" category was tallied and provided this instrument's third criterion measure.

The fourth criterion measure from this instrument was the emphasis or degree of attention each subject gave to the consideration of outcomes. A ratio of the number of seconds spent viewing slides from the outcome category over the total number of seconds during which all slides were viewed was multiplied by the number of outcome slides viewed by the subject in order to correct for inefficient or inattentive viewing of only a few "outcome" slides for a large number of seconds. The fifth criterion was the problem solution selected by the subject. Of the six alternative solutions to the problem, three were deliberately structured so as to be more appropriate, based on the information available. Note was taken of whether or not each subject selected one of the more appropriate answers

2. Personal Problem Situation. In this second simulation, each subject was again given oral instructions with an accompanying written instruction sheet and was told to think of a problem he currently was facing in his own life. It was indicated that the problem should be of real importance to him; for example, it might be something he wanted to achieve, such as to overcome an undesirable behavior. He was given an opportunity to write the problem down if he wished. The key task in this simulation was the selection from an array of alternative hypothetical persons, the one the subject felt he would most like to assist him in solving his personal problem.

Information on each of six hypothetical individuals was placed in a series of five packets. Inside one of these five packets was a photograph of the individual while the other packets each contained a tape cartridge providing information on the hypothetical individual's interests, values, abilities, and background (e.g., previous significant experiences and future plans). Complete scripts of the tape cartridges are included as Appendix G. An "Instruction Sheet and Information Packet Program" describing in general terms the information available on each hypothetical individual was given to each student. A copy of this material forms Appendix H. Once again each subject was informed that he must remain in the testing room for the full ten minutes allotted for solving the problem. Alternative activities were available in the testing room if the subject chose to spend time on something other than the criterion task. In this simulation, several tape cartridges containing both popular and classical music were provided as alternate activities. Such materials were provided in both problem-solving simulations to answer at least to some degree the objection that subjects would do well on the dependent variables simply

because no activity outside of the problem-solving task was available to them.

The Personal Problem Situation simulation yielded two criterion measures. The first of these was the number of hypothetical individuals about whom each subject sampled some information. This provided an indication of the number of alternatives receiving some consideration. A second criterion measure from this instrument assessed the emphasis or degree of attention each subject gave to each alternative. A score was obtained for each subject by assigning five points to his first selection of information from each alternative available, four points for a second selection from the same alternative, and so forth. Through this weighting procedure, both the breadth and depth of selections was rewarded. Appendix K provides examples of how sample scores on this criterion measure were obtained.

For this criterion measure, the final choice was not scored or used in data analysis since there were no "correct" responses as there were in the other simulation criterion. The form which appears as Appendix F was used by the assistant to record subject behavior during this problem-solving simulation.

3. Checklist for Solving Problems in Real Life. Additional criterion measures were derived from the pre- and post-treatment administrations of the "Checklist for Solving Problems in Real Life," a copy of which is provided in Appendix I. This instrument, composed of 12 statements describing personal problem-solving behaviors, was designed to assess each subject's need and desire for training in effective problem-solving behaviors. For statements one through ten, each subject

had to decide if the statement accurately reflected his usual problem-solving behaviors. If it did, he placed a checkmark in the column labeled "True"; if it did not, a checkmark was placed in the column marked "False." The statements were counterbalanced as to direction so that, for example, a "True" response sometimes denoted a desirable, and at other times an undesirable personal problem-solving behavior. Statements one through ten on this instrument were designed to reflect whether or not the subject typically exhibited behavior in each of the six skill areas of problem-solving when he attempted to solve his own personal problems.

Statements 11 and 12 gave each subject an opportunity to express in two ways a desire for receiving training in effective personal problem solving. In statement 11, each subject could express an interest in general improvement of his problem-solving behavior; while in response to statement 12, he could make a specific request for training in the behaviors described in statements one through ten. Responses to these statements by the subjects prior to and after exposure to the various treatment experiences were examined and two specific criterion measures were formulated from changes in these responses. The changes in subject responses to this instrument were closely examined and yielded two criterion measures. The first criterion measure involved changes in the self reports of personal problem-solving behaviors provided by each subject between the pre- and post-administration of this check list. For example, if a subject reported before the experiment began that he did not usually consider many different ways to solve a problem (i.e., he checked "False" opposite statement 1), and subsequently at the end of the experiment responded that he did usually consider many different ways to

solve a problem (i.e., he checked "True" opposite that statement), one point was assigned. Similarly, for each response which changed in an unfavorable direction (i.e., either a subject reported that he no longer performed a desirable behavior or reported that he now performed an undesirable problem-solving behavior which he previously did not perform), a point was subtracted from the subject's score on this criterion measure. Appendix L illustrates responses scored in a positive and in a negative manner. Due to the fact that both positive and negative scores resulted from this scoring procedure, all scores were transformed by assigning the lowest score obtained a value of zero, thus eliminating the possibility of negative scores.

A second criterion measure derived from this checklist involved the tabulation of requests for assistance made by students. Positive responses to statements 11 and 12 of the checklist indicated such requests for assistance. Additionally, students were asked to circle the number of each statement specifying a behavior with which they wished some help. All requests were tallied for both administrations of the instrument so that a subject's score corresponded to the change in such requests for assistance. For example, if a subject responded positively to both statements 11 and 12 and circled five statements in the pre-experimental administration of the instrument, he was scored as having made seven requests for assistance. Subsequently, if the same subject responded in a positive manner to only statement 11 and circled two statements on the post-treatment administration of the instrument, he was credited with three requests for assistance after having received the treatment. This subject made four fewer requests for assistance after having received the treatment. Here again, negative scores were possible since an individual might actually

make more requests for assistance after, as compared to before, the treatment. Scores were again transformed in the manner noted above to eliminate negative values. It was expected that effective training would reduce the assistance requests made by each subject.

Hypotheses

The research hypotheses were as follows:

1. Subjects assigned to the video-tape with reinforcement treatment will score higher on the criteria than will subjects assigned to any other treatment condition.
2. Subjects assigned to the three treatment conditions involving social reinforcement will score higher on the criteria than will subjects exposed to similar conditions not involving social reinforcement.
3. Subjects assigned to the two video-tape treatment conditions will score higher on the criteria than will subjects assigned to the two treatments involving written booklets or to the two treatments involving audio-tape, or to a treatment involving an oral lecture, or to the baseline control condition.
4. Subjects assigned to the two audio-tape treatment conditions will score higher on the criteria than will subjects assigned to the two treatments involving written booklets.
5. Subjects assigned to the oral lecture treatment condition will score higher on the criteria than will subjects assigned to the baseline control treatment.

No interactions between media, the use of reinforcement, and the sex of subjects were hypothesized.

Experimental Procedures

Treatment Procedures. Each treatment group was convened in separate rooms within the counseling center at the school and all groups were exposed to treatment experiences within a span of four days. Thus, an attempt was made to minimize the confounding effects of students in different treatment groups spreading information to each other about the study. Though each treatment group had been assigned a specific time to convene and specific subjects had been assigned to each treatment, several changes in the subject composition of each group were necessitated by the realities of the school situation. Factors such as teacher refusal to dismiss a student from class, inefficiency of the system by which messages were hand-carried to classrooms in advance of the scheduled appointment time, and a heavy absentee rate all worked against the administration of treatment procedures as previously planned. However, additional subjects were drawn on a sequential basis from the list of alternates formed earlier from the original subject pool. Additionally, subjects were shifted from one treatment group to another in some instances due to the need to run particular treatment groups at a pre-determined time during the school day. Determinations as to exactly who was shifted to which treatments were an on-the-spot function of the number of subjects assigned to each treatment group who had arrived by a given time and the particular treatments occurring at that hour which had of necessity to be run. Both the limited availability and expense of equipment (e.g., video-tape recorder/player) as well as the limited availability of space in the school counseling center contributed to this need. Since the 128 subjects were chosen originally in a random fashion from the pool of 175 subjects, it was presumed that the remaining

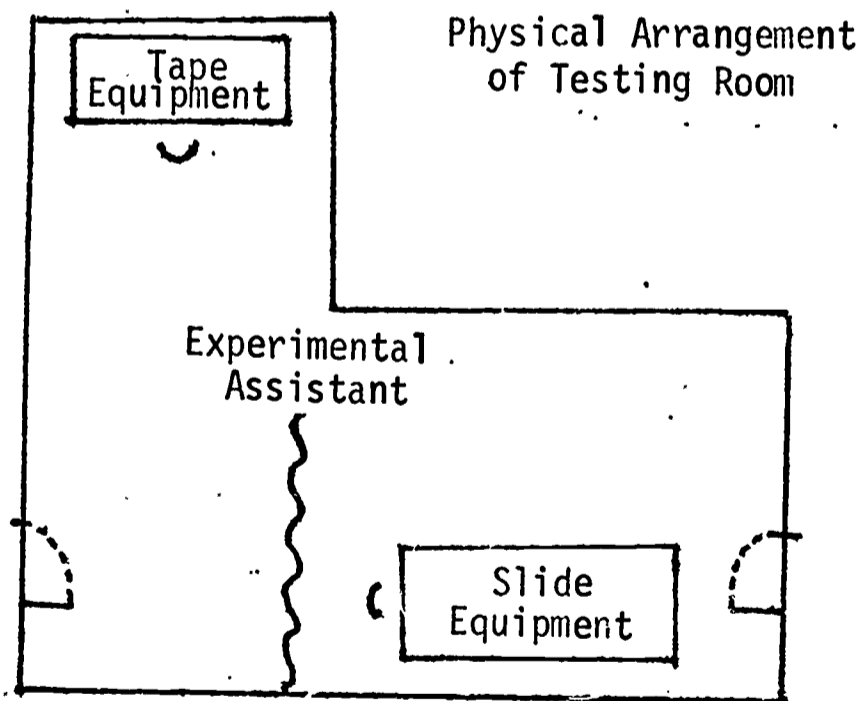
47 subjects formed a random group, and subjects were chosen on a sequential basis from the list of alternates.

The subjects were greeted by an experimental assistant as they arrived at the counseling center and were assigned to the correct room. As soon as the eight assigned students or the required number of replacement subjects had arrived, the treatment was begun. Each treatment not involving the use of social reinforcement was administered in one session of approximately 30 minutes. Those treatments involving social reinforcement procedures took approximately ten minutes longer. It was assumed that the additional ten minutes necessary to the administration of the treatments involving social reinforcement was of no importance as a discrete variable, the social reinforcement procedures alone accounting for any differences resulting on the dependent variables. A standardized set of opening and closing remarks, a copy of which appears in Appendix A, was given by an experimental assistant. After the closing remarks, the subjects were allowed to return to their classes. Subjects were told in the introductory remarks that there was much concern about the importance of students knowing how to solve real-life problems wisely, and that materials had been prepared to help them learn effective personal problem-solving. A copy of this opening statement appears as a portion of Appendix A. Following these remarks the various treatment experiences described earlier were administered. No information regarding the purpose of what was being done, other than the information contained in the opening statement, was given to the subjects.

Data Collection Procedures. Beginning six days following the completion of the treatment procedures, the subjects were summoned

individually in random order to the counseling suite of the high school in which the study took place. Upon his or her arrival, each was greeted by an experimental assistant who explained that since the student had been so helpful in trying out materials the previous week, he had been called in again, this time for the purpose of giving student reactions to some new guidance materials. After reading the instructions provided for the first simulation, each subject entered into the experimental room where both simulation situations were arranged. An L-shaped room was provided for data collection so that different subjects in the two simulations could work simultaneously with minimum interference to each other. In addition, a partial partition was placed between the sections of the room to facilitate this separation. Another advantage to this procedure was that the observer was not conspicuous in the criterion situations since she was both partially screened by the partition and had to divide her attention between two subjects working on different tasks, as shown in Figure 4 below.

FIGURE 4



After being shown the procedure for operating the slide projector used in the first simulation, each subject began the task. A number of

subjects experienced difficulty with this task or with the operating of the tape cassette machine, necessitating on some occasions that both subjects being exposed to the criterion devices stop while further assistance was provided by the experimental assistant or by another of the subjects. At the end of ten minutes, he was asked to choose a solution to the problem, then was led to the section of the room utilized for the second simulation situation, and was provided with the instruction sheet for that simulation. Brief instructions were given regarding the use of the tape cassette player just before each subject began the criterion task. At the end of ten minutes, each subject was requested to indicate the person whom he would most like to have assist him in solving a personal problem. Before each subject left the experimental room, he completed a reaction sheet on which were printed several questions designed to elicit his reactions to the guidance materials he had just used. These reaction sheets were included to give subjects the impression that they were evaluating guidance materials as had been explained to them earlier. A copy of this reaction sheet is found in Appendix J. Accompanying the reaction sheet was a copy of the "Checklist for Solving Problems in Real Life," included as Appendix I, to which he was asked to respond once again. He was thanked for his participation and was told to leave the materials with the assistant outside the room when he was finished. Data collection was spread over a period of two weeks due to the unavailability of students at scheduled times. Criterion data were obtained from a total of 110 of the original 128 subjects. The remaining 18 subjects were lost due to their absence or unavailability during the data collection period at the school.

Statistical Procedures

These then were the nine dependent variables derived from the criterion instruments. Subsequent computer analyses of the collected data were undertaken at the Stanford Computer Facility on an IBM 360/67 computer with computer programs drawn from the BMD Biomedical Computer Programs (Dixon, 1967).

First, BMD program 07D was run on the data from all criteria. This program provided histograms, means and standard deviations for subjects in all treatment groups on each of nine criteria, and facilitated checks on the accuracy of the data. Also available from the program were one-way analyses of variance across all treatment groups on each of the criteria and correlation matrices of the intercorrelations of criterion scores within each treatment group.

Subsequent to this analysis, one criterion measure (i.e., the alternative solution selected by the subject in the Hypothetical Problem Situation simulation) was extracted due to its dichotomous distribution, and dealt with separately through chi-square procedures in an attempt to uncover any significant difference existing between the number of subjects selecting each possible solution to the problem in each of the treatment groups. The first chi-square test compared each of the treatment groups with a combined control group composed of lecture and baseline control conditions and the subsequent two tests compared the effects of treatments utilizing various training media (i.e., video-tape, audio-tape, written booklet) and the effects of treatments in which social reinforcement techniques were and were not employed.

The remaining eight criterion measures underwent three-way analysis of variance procedures implemented through the running of BMD

program 05V. A 2 x 2 x 6 design was employed in a search for main and interaction effects of sex, reinforcement, and treatment group. Treatment groups seven and eight (i.e., lecture and control treatments) were not included in these analyses due to the lack of parallel treatment groups employing reinforcement procedures as noted earlier.

These analyses were followed by t-tests comparing the effects of the lecture and control groups on each of these criterion measures in order to study the feasibility of collapsing these two treatment groups into a single combined control group. Since no significant t's were uncovered, the two groups were subsequently combined and further t-tests were calculated comparing the effect of this combined control group with the effect of each of the remaining six treatment groups on each of the eight criterion measures.

III. RESULTS AND DISCUSSION

Results

Results on a total of nine criteria derived from the three major criterion measures were obtained. Explanations of the derivations of these criteria listed below are found in Chapter II. The reporting of results relative to these criteria will be organized primarily around the sequence of statistical analyses that were employed. Subsequently, each hypothesis will be discussed in light of the results reported and with regard to possible explanations for such results. In some instances, results of criteria will be reported in an order other than that followed in the list of criteria below. For example, it might be more meaningful to discuss simultaneously results on analogous criteria from two different criterion measures rather than to present them in the order assigned.

1. Hypothetical Problem Simulation

- A. Number of viewed slides presenting a possible alternative problem solution.
- B. Time given to slides presenting alternatives in relation to total time viewing all slides.
- C. Number of viewed slides presenting information on the possible outcomes associated with the implementation of particular alternatives.
- D. Time given to slides presenting information on the possible outcomes of alternatives in relation to total time viewing all slides.
- E. Rated appropriateness of the alternative selected as "best."

2. Personal Problem Simulation

- F. Number of hypothetical individuals (i.e., alternatives) about whom some information was selected.
- G. Rated efficiency of information packet selections within and across hypothetical individuals (i.e., alternatives).

3. Checklist for Solving Problems in Real Life

- H. Net increase (i.e., pre- and post-treatment) in each subject's self-reports of desirable personal problem-solving behaviors.
- I. Net decrease (i.e., pre- and post-treatment) in the number of written requests for assistance with personal problem-solving behaviors.

Overall Treatment Effects and Comparison of Active vs. Baseline

Control Treatments. In an initial attempt to uncover any gross differences in treatment effects, the BMD program 07D was run on each of the nine criteria. This procedure included the computation of a one-way analysis of variance on each criterion. The resultant means and F ratios appear as Table 1. Desired levels of statistical significance were set at $p < .10$ and $p < .05$ for all analyses. In comparing the active and baseline control groups, no differences at the desired levels of significance were found though in the case of two variables, A and C, significance was approached, ($p < .25$). The two variables on which these trends were found were of considerable interest in this investigation. While findings at the $p < .25$ level of significance are not noted in the data tables and seldom considered in most professional literature, they will from time to time be mentioned in the text. The rationale for reporting such findings lies in their usefulness as clues for future investigations and in the importance of such trends when the research deals with complex behaviors which are exhibited in contexts which are not amenable to tight control of all potentially confounding variables (i.e., non-laboratory settings).

To determine whether the lecture treatment differed from the baseline

TABLE 1
N's, MEANS, SD's, AND ONE-WAY ANOVA F RATIOS FOR RAW SCORES ON EACH OF NINE DEPENDENT VARIABLES

Dependent Variable	TREATMENT CONDITION										One-Way ANOVA F Ratio
	Video-Tape without Reinforcement	Audio-Tape without Reinforcement	Written Booklet without Reinforcement	Video-Tape with Reinforcement	Audio-Tape with Reinforcement	Written Booklet with Reinforcement	Lecture	Baseline Control			
A. Number of viewed slides presenting a possible alternative problem solution.	\bar{X} 3.467 σ 1.552 N 15	3.571 2.027 14	2.333 2.015 12	3.933 1.223 15	3.308 1.702 13	4.167 1.528 12	3.692 1.548 13	4.067 1.710 15	1.505		
B. Time given to slides presenting alternatives in relation to total time viewing all slides.	\bar{X} 47.267 σ 33.553 N 15	74.357 114.604 14	26.583 33.776 12	46.933 29.581 15	45.923 53.641 13	58.583 51.235 12	62.769 44.389 13	82.200 72.691 15	1.153		
C. Number of viewed slides presenting information on the possible outcomes associated with the implementation of particular alternatives.	\bar{X} 5.800 σ 3.427 N 15	4.357 3.201 14	3.083 2.875 12	5.933 2.463 15	4.385 2.815 13	5.167 2.657 12	4.692 2.287 13	5.133 1.922 15	1.469		
D. Time given to slides presenting information on the possible outcomes of alternatives in relation to total time viewing all slides.	\bar{X} 192.000 σ 144.086 N 15	130.857 143.924 14	97.500 103.379 12	183.067 119.421 15	146.846 186.230 13	186.500 161.700 12	125.154 71.538 13	153.067 86.711 15	.860		
E. Rated appropriateness of the alternative selected as "best."	\bar{X} 1.467 σ .516 N 15	1.500 .519 14	1.583 .515 12	1.733 .458 15	1.308 .480 13	1.500 .522 12	1.692 .480 13	1.733 .458 15	1.280		
F. Number of hypothetical individuals (i.e., alternatives) about whom some information was selected.	\bar{X} 4.333 σ 1.589 N 15	4.000 1.754 14	4.250 1.603 12	4.643 1.216 14	4.615 1.557 13	4.500 1.382 12	5.214 1.051 14	4.933 1.163 15	1.019		
G. Rated efficiency of information packet selections within and across hypothetical individuals (i.e., alternatives).	\bar{X} 41.600 σ 12.704 N 15	38.143 12.328 14	42.250 12.491 12	42.500 9.960 14	40.385 12.373 13	46.083 12.221 12	47.571 5.893 14	43.667 7.979 15	1.034		
H. Net increase (i.e., pre- and post-treatment) in each subject's self-reports of desirable personal problem-solving behaviors.	\bar{X} 2.070 σ 8.000 N 15	1.765 7.250 12	2.644 7.083 12	2.335 8.286 14	1.557 7.385 13	1.371 7.333 12	2.293 8.214 14	3.089 7.400 15	.595		
I. Net decrease (i.e., pre- and post-treatment) in the number of written requests for assistance with personal problem-solving behaviors.	\bar{X} 7.200 σ 1.897 N 15	6.750 1.658 12	7.250 4.245 12	7.071 1.492 14	6.692 1.932 13	6.167 1.801 12	7.786 3.093 14	6.400 2.971 15	.559		

*Statistically significant at the $p < .10$ level.
**Statistically significant at the $p < .05$ level.
***Statistically significant at the $p < .01$ level.

was not, in terms of its effects, an entity different from the baseline control treatment in which programmed statistical materials were used. In order to confirm or contradict this conclusion, t-test procedures were undertaken to compare the effect of the live lecture treatment with that of the baseline control treatment on each of eight criteria. Prior to this analysis, criterion E, owing to its dichotomous distribution was separated from the other criteria and analyzed through the use of distribution-free (i.e., non-parametric) techniques.

Table 2 presents the t-values resulting from the t-test procedures. Though in a number of cases the live-lecture group appeared to be somewhat superior to the baseline control group, none of the t-values attained desired levels of significance. Therefore, data from these two treatment groups were subsequently "pooled" for further analysis. Hereafter, except when specifically noted, this pooled control group will be referred to rather than the active and baseline control conditions as previously specified.

Pooled Control Treatment vs. Selected Experimental Treatments.

Further t-tests were then employed in an effort to uncover any existing differences between the effect of the pooled control group and the effect of each of the remaining six treatment conditions on each of the eight dependent variables involving parametric data. The results of the 48 t-tests appear as Table 3. One of the dependent variables of prime concern was variable A and with regard to this variable it is striking to note that the scores of the pooled control group actually were higher than the scores of four of the six groups with which it was compared (i.e., all three conditions not utilizing reinforcement and the audio-tape condition which did include reinforcement procedures). As can be noted from Table 3,

Table 2

RESULTS OF t-TEST PROCEDURES COMPARING EFFECTS OF ACTIVE AND BASELINE CONTROL CONDITIONS UPON EACH OF EIGHT DEPENDENT VARIABLES

Dependent Variable	t-Ratio
A. Number of viewed slides presenting a possible alternative problem solution.	0.583
B. Time given to slides presenting alternatives in relation to total time viewing all slides.	0.808
C. Number of viewed slides presenting information on the possible outcomes associated with the implementation of particular alternatives.	0.534
D. Time given to slides presenting information on the possible outcomes of alternatives in relation to total time viewing all slides.	0.887
F. Number of hypothetical individuals (i.e., alternatives) about whom some information was selected.	0.657
G. Rated efficiency of information packet selections within and across hypothetical individuals (i.e., alternatives).	0.733
H. Net increase (i.e., pre- and post-treatment) in each subject's self-reports of desirable personal problem-solving behaviors.	0.773
I. Net decrease (i.e., pre- and post-treatment) in number of written requests for assistance with personal problem-solving behaviors.	1.188

*Statistically significant at the $p < .10$ level.

**Statistically significant at the $p < .05$ level.

***Statistically significant at the $p < .01$ level.

Table 3

RESULTS OF t-TEST PROCEDURES COMPARING EFFECTS OF POOLED CONTROL CONDITION AND EACH OF THE SIX REMAINING TREATMENT CONDITIONS

Dependent Variable	Pooled Control Condition Versus					
	Video-Tape without Reinforcement	Audio-Tape without Reinforcement	Written Booklet without Reinforcement	Video-Tape with Reinforcement	Audio-Tape with Reinforcement	Written Booklet with Reinforcement
A. Number of viewed slides presenting a possible alternative problem solution.	.814	.543	*** 2.523	-.084	1.033	-.489
B. Time given to slides presenting alternatives in relation to total time viewing all slides.	* 1.492	-.042	*** 2.427	* 1.535	* 1.349	.709
C. Number of viewed slides presenting information on the possible outcomes associated with the implementation of particular alternatives.	-1.014	.679	** 2.280	* -1.380	.677	-.298
D. Time given to slides presenting information on the possible outcomes of alternatives in relation to total time viewing all slides.	* -1.484	.261	* 1.375	* -1.373	-.158	-1.182
F. Number of hypothetical individuals (i.e., alternatives) about whom some information was selected.	** 1.757	** 2.380	** 1.837	1.123	1.055	* 1.360
G. Rated efficiency of information packet selections within and across hypothetical individuals (i.e., alternatives).	1.285	** 2.419	1.034	1.116	* 1.656	-.168
H. Net increase (i.e., pre- and post-treatment) in each subject's self-reports of desirable personal problem-solving behaviors.	-.253	.623	.748	-.569	.493	.544
I. Net decrease (i.e., pre- and post-treatment) in the number of written requests for assistance with personal problem-solving behaviors.	-.148	.333	-.149	-.002	.400	.932

*Statistically significant at the $p < .10$ level.**Statistically significant at the $p < .05$ level.***Statistically significant at the $p < .01$ level.

NOTE: Comparisons were always made with the score of the pooled control group as the basic referent. Therefore, a negative t-value denotes that the mean score of the treatment in question proved to be higher than that of the pooled control group. Similarly, a positive t-value is evidence of the reverse phenomenon.

one of these differences, a comparison with the non-reinforcement booklet condition, reached a desired level of significance ($p < .01$). Only the scores of subjects in the video-tape and booklet treatments employing reinforcement procedures proved to be higher than those in the pooled control group, though not at the desired statistically significant level. A similar finding discussed below resulted on variable F in the second simulated situation.

Variable C provided information on just how many of the 12 slides presenting information on possible outcomes were viewed by the subjects. On this variable, the video-tape approach utilizing reinforcement techniques was clearly superior ($p < .10$) when compared with the pooled control effect. Two other groups, the video-tape without reinforcement condition and the written booklet combined with reinforcement, also proved more effective than the control condition, though the differences did not achieve desired levels of statistical significance. Other comparisons on this variable found the effect of both audio-tape treatments almost identical but not significantly below that of the control, and the effect of the written booklet without reinforcement significantly below ($p < .05$) that of the control.

The scores from the pooled control group on variable B proved to be significantly higher than those of subjects in the booklet without reinforcement group ($p < .01$) and higher than the scores of subjects exposed to either of the video-tape treatments or those of subjects in the audio-tape with reinforcement group ($p < .10$). The audio-tape without reinforcement and the written booklet with reinforcement treatments appeared not to differ from the pooled control in their effect. From data on this criterion, it is clear that the subjects in the pooled control group spent a greater number of seconds per slide relative to their total viewing time

on the slides they selected from the "alternative" category than did most other subjects. Information from variable D, however, presented a somewhat different picture. The relative time emphasis given to the slides from the "outcome" category showed the effect of the video-tape condition not containing reinforcement superior at a desirable level of significance ($p < .05$) to that of the pooled control, while the superiority of the parallel treatment involving reinforcement reached the $p < .10$ level. Though scores of subjects in the written booklet with reinforcement group approached significance ($p < .25$) when compared to scores of subjects in the pooled control group, scores of subjects in the two audio-tape treatments did not differ from those of control subjects and scores of subjects who experienced the written booklet without reinforcement group appeared significantly below those of subjects in the pooled control condition ($p < .10$).

t-test results relative to variable F revealed the scores of subjects in the pooled control group to be far higher ($p < .05$) than the scores of subjects in each of the three treatments not employing social reinforcement procedures and significantly higher ($p < .10$) than those of subjects exposed to the written booklet treatment which included reinforcement. Only the scores of subjects in the video-tape and audio-tape treatments with reinforcement failed to be appreciably lower than scores of subjects in the pooled control treatment. Results on variable G proved to be slightly more balanced in that the scores of subjects in the pooled control group surpassed those of only two of the six competing treatment groups. While scores from subjects in both audio-tape treatments were found to be significantly lower than those of the control subjects (without reinforcement $p < .05$, with reinforcement $p < .10$), control subjects' scores failed to differ noticeably from those attained by subjects in either the video-tape treatments or the

written booklet treatment in which no reinforcement procedures were used. The scores of subjects in the written booklet treatment using reinforcement were found to be slightly but not significantly higher than those of subjects in the pooled control group.

No t-values at desired significance levels were uncovered in data derived from two additional criteria. Variable I assessed the number of written requests for assistance in problem-solving training made by subjects after, as opposed to before, they were exposed to one of the experimental treatments. Invariably, fewer requests were made after the treatment, but no treatment was found to result in significantly more changes in this regard than any other treatment. Similarly, no significant differences at the desired levels were found on variable H which measured the ability of the various treatments to inspire changes in subjects' self-reports of their typical problem-solving behaviors.

As noted earlier, variable E, the particular alternative solution chosen by the subject as most appropriate in the Hypothetical Problem Simulation was analyzed separately through non-parametric procedures. The chi-square technique was chosen for this purpose. The $p < .10$ level of significance was chosen as the critical value for rejection of the null hypothesis that no differences existed between the number of persons in each treatment group achieving a "correct" response on this measure. Table 4 reveals that the difference between the live lecture and the baseline control group in this regard did not reach the desired level of significance. Thus once again, these two groups were combined to form a pooled control group. Subsequently, an overall chi-square analysis between treatment groups was undertaken. As can be seen in Table 5, the overall chi-square value fell short of achieving significance, but was sufficiently

Table 4

RESULTS OF CHI SQUARE PROCEDURES COMPARING THE NUMBERS OF SUBJECTS IN THE LECTURE AND BASELINE CONTROL GROUPS SELECTING AN APPROPRIATE SOLUTION TO THE HYPOTHETICAL PROBLEM SIMULATION

Treatment Group	Acceptable Response		Unacceptable Response		Marginal Totals
	Observed	Expected	Observed	Expected	
Lecture	9	9.3	4	3.7	13
Baseline Control	11	10.7	4	4.3	15
Totals	20	20.0	8	8.0	28

Obtained Value $\chi^2 = .06$

Critical Value at $p < .10$ level w/1 df = 2.71

Table 5

RESULTS OF CHI SQUARE PROCEDURES COMPARING THE NUMBERS OF SUBJECTS IN EACH TREATMENT SELECTING AN APPROPRIATE SOLUTION TO THE HYPOTHETICAL PROBLEM SIMULATION

Treatment Group	Acceptable Response		Unacceptable Response		Marginal Totals
	Observed	Expected	Observed	Expected	
Video-Tape without Reinforcement	7	8.5	8	6.5	15
Audio-Tape without Reinforcement	7	8.0	7	6.0	14
Written Booklet without Reinforcement	7	6.8	5	5.2	12
Video-Tape with Reinforcement	11	8.5	4	6.5	15
Audio-Tape with Reinforcement	4	7.4	9	5.6	13
Written Booklet with Reinforcement	6	6.8	6	5.2	12
Pooled Control	20	15.9	8	12.1	28
Totals	62	61.9	47	47.1	109

Obtained Value $\chi^2 = 8.89$

Critical Value at $p < .10$ level w/6 df = 10.64

Table 6
RESULTS OF CHI SQUARE PROCEDURES COMPARING THE NUMBER OF SUBJECTS (GROUPED ACROSS REINFORCEMENT CONDITIONS)
SELECTING AN APPROPRIATE SOLUTION TO THE HYPOTHETICAL PROBLEM SIMULATION

Treatment Group	Acceptable Response		Unacceptable Response		Marginal Totals
	Observed	Expected	Observed	Expected	
Video-Tape	18	17.1	12	12.9	30
Audio-Tape	11	15.4	16	11.6	27
Written Booklet	13	13.7	11	10.4	24
Pooled Control	20	15.9	8	12.1	28
Totals	62	62.1	47	47.0	109

Obtained Value of $\chi^2 = 5.58$

Critical Value at $p < .10$ level w/3 df = 6.25

Table 7
RESULTS OF CHI SQUARE PROCEDURES COMPARING THE NUMBER OF SUBJECTS (GROUPED ACROSS MEDIA)
SELECTING AN APPROPRIATE SOLUTION TO THE HYPOTHETICAL PROBLEM SIMULATION

Treatment Group	Acceptable Response		Unacceptable Response		Marginal Totals
	Observed	Expected	Observed	Expected	
Without Reinforcement	21	23.3	20	17.7	41
With Reinforcement	21	22.7	19	17.3	40
Pooled Control	20	15.9	8	12.1	28
Totals	62	61.9	47	47.1	109

Obtained Value of $\chi^2 = 3.67$

Critical Value for $p < .10$ level w/2 df = 4.60

close to the critical value to warrant further chi-square analyses which were then conducted. The first analysis, the data from which are shown in Table 6, grouped subjects according to media regardless of the reinforcement conditions used and then compared the number of each treatment group's subjects choosing one of the appropriate alternative solutions. Table 7 provides data from a second analysis which made a similar comparison between the responses of subjects in treatments employing social reinforcement and those of subjects in treatments where such techniques were not present. In both cases, the chi-square values approached, but did not reach desired levels of significance. Such results would indicate a high likelihood that there were no differences in the number of subjects selecting an appropriate response on criterion E, regardless of whether these subjects were grouped by specific treatment conditions, by the training medium to which they were exposed, or by their exposure to social reinforcement procedures.

Influence of Sex, Media, and Reinforcement Upon Selected Treatment Groups. In order to pinpoint more precisely the effects of the various treatment media, of the social reinforcement procedures, and of subjects' sex, a three-way analysis of variance (media x reinforcement x sex) was executed through use of BMD program 05V on parametric data from each of eight criterion measures. Since the live lecture and baseline control treatments did not have parallel groups employing social reinforcement procedures, these two treatments were not included in this analysis. Among the remaining six treatments, subjects exposed to video-tapes, audio-tapes, and written booklet treatments were compared, subjects experiencing social reinforcement procedures were compared with subjects not experiencing reinforcement and subjects were compared on the basis of sex. Table 8 portrays means, standard deviations and all cell sizes used in each of these analyses.

Table 8
N's, MEANS, AND SO'S FOR THREE-WAY ANOVA ON EACH OF EIGHT DEPENDENT VARIABLES

Dependent Variable	Male						Female					
	Without Reinforcement			With Reinforcement			Without Reinforcement			With Reinforcement		
	Video-Tape	Audio-Tape	Written Booklet	Video-Tape	Audio-Tape	Written Booklet	Video-Tape	Audio-Tape	Written Booklet	Video-Tape	Audio-Tape	Written Booklet
A. Number of viewed slides presenting a possible alternative problem solution.	\bar{X} 3.000 σ 1.825 N 7	3.285 2.138 7	2.428 1.902 7	3.714 1.380 7	3.125 1.959 8	3.714 1.253 7	3.875 1.246 8	3.857 2.035 7	2.200 2.387 5	4.125 1.125 8	3.600 1.341 5	4.800 1.788 5
B. Time given to slides presenting alternatives in relation to total time viewing all slides.	\bar{X} 42.428 σ 36.059 N 7	80.428 150.539 7	29.571 32.160 7	39.142 31.876 7	47.500 64.258 8	58.000 49.264 7	51.500 33.060 8	68.285 75.557 7	22.399 39.348 5	53.750 27.665 8	43.399 37.326 5	59.399 59.806 5
C. Number of viewed slides presenting information on the possible outcomes associated with the implementation of particular alternatives.	\bar{X} 4.857 σ 3.933 N 7	3.714 3.592 7	3.142 2.794 7	5.714 2.871 7	3.750 3.105 8	5.285 2.360 7	6.625 2.924 8	5.000 2.886 7	3.000 3.316 5	6.125 2.295 8	5.400 2.190 5	5.000 3.316 5
D. Time given to slides presenting information on the possible outcomes of alternatives in relation to total time viewing all slides.	\bar{X} 149.571 σ 143.430 N 7	99.285 98.962 7	102.571 103.070 7	177.142 124.606 7	101.125 96.781 8	217.428 184.025 7	229.125 143.223 8	162.428 181.000 7	90.399 115.526 5	188.250 123.078 8	220.000 277.096 5	143.200 130.723 5
F. Number of hypothetical individuals (i.e., alternatives) about whom some information was selected.	\bar{X} 5.000 σ 1.527 N 7	3.857 1.864 7	4.714 1.380 7	4.166 1.329 6	5.000 1.309 8	4.428 1.397 7	3.750 1.488 8	4.142 1.772 7	3.600 1.816 5	5.000 1.069 8	4.000 1.870 5	4.600 1.516 5
G. Rated efficiency of information packet selections within and across hypothetical individuals (i.e., alternatives).	\bar{X} 45.857 σ 15.137 N 7	35.285 12.919 7	44.428 8.772 7	40.166 13.166 6	43.750 12.521 8	43.285 12.566 7	37.875 9.613 8	41.000 11.972 7	39.200 17.137 5	44.250 7.225 8	35.000 11.224 5	50.000 11.874 5
H. Net increase (i.e., pre- and post-treatment) in subject's self-reports of desirable personal problem-solving behaviors.	\bar{X} 9.428 σ 1.902 N 7	7.200 2.167 5	6.285 1.603 7	8.333 3.204 6	7.750 1.035 8	7.285 1.253 7	6.750 1.281 8	7.285 1.603 7	8.200 3.563 5	8.250 1.669 8	6.800 2.167 5	7.400 1.673 5
I. Net decrease (i.e., pre- and post-treatment) in the number of written requests for assistance with personal problem-solving behaviors.	\bar{X} 7.857 σ 1.772 N 7	5.800 .045 5	7.000 5.196 7	7.000 1.788 6	7.000 2.138 8	6.000 2.000 7	6.625 1.922 8	7.428 1.902 7	7.600 2.966 5	7.125 1.355 8	6.200 1.643 5	6.400 1.673 5

Table 9
F RATIOS OBTAINED AS THE RESULT OF THREE-WAY ANOVA (SEX x REINFORCEMENT x MEDIA)

Dependent Variable	Main Effects			Interactions			
	Sex	Reinforcement	Media	Sex x Reinforcement	Sex x Media	Reinforcement x Media	Second Order Interactions
A. Number of viewed slides presenting a possible alternative problem solution.	1.875	** 3.621	.346	.105	.026	* 2.494	.469
B. Time given to slides presenting alternatives in relation to total time viewing all slides.	.000	.006	.538	.068	.191	1.481	.001
C. Number of viewed slides presenting information on the possible outcomes associated with the implementation of particular alternatives.	1.335	1.481	* 2.528	.078	.531	.806	.154
D. Time given to slides presenting information on the possible outcomes of alternatives in relation to total time viewing all slides.	.881	1.160	.845	.142	1.326	.625	.377
F. Number of hypothetical individuals (i.e., alternatives) about whom some information was selected.	1.000	1.056	.059	1.009	.049	.063	2.238
G. Rated efficiency of information packet selections within and across hypothetical individuals (i.e., alternatives).	.111	.610	1.303	.339	.089	.242	* 2.629
H. Net increase (i.e., pre- and post-treatment) in each subject's self-reports of desirable personal problem-solving behaviors.	.351	.063	1.958	.008	* 2.427	.012	* 2.404
I. Net decrease (i.e., pre- and post-treatment) in the number of written requests for assistance with personal problem-solving behaviors.	.048	.621	.378	.150	.406	.364	1.040

*Statistically significant at the $p < .10$ level

**Statistically significant at the $p < .05$ level

***Statistically significant at the $p < .01$ level

Table 9 presents all the resulting F ratios. Results, in terms of both main effects and interactions, will be reported by criteria.

An analysis of variable A produced two D ratios reaching the desired significance levels of $p < .10$. The first of these was a reinforcement by media interaction which was attributable primarily to the strength added to the written booklet approach by the addition of social reinforcement procedures (cf. Table 8). In fact this treatment moved from the least effective to the most effective treatment with the females, and tied with video-tape utilizing reinforcement as the most effective treatment with males. The effect of introducing reinforcement with the video-tape strategy was more moderate. The effect of reinforcement was, however, sufficient in the case of both video-tape and written booklet that it more than offset a reversal of this result among treatment conditions employing the audio-tape. Examination of main effect results on this variable revealed that the addition of reinforcement procedures had a significant ($p < .05$) effect which resulted almost entirely from the power social reinforcement added to the written booklet and video-tape materials. Though a trend ($p < .25$) toward higher scores by females than males was found on this measure, the main effect of sex did not reach the required level of significance.

Several variable C findings appearing in Table 8 are of import. The overall media main effect was significant ($p < .10$) with video-tape, audio-tape, and written booklet strategies being effective in that order. Data from variable C were consistent with data from variable A in the sense that adding social reinforcement to the written booklet strategy consistently increased its effectiveness appreciably. In the case of the males responding on variable C, the booklet strategy moved from third to second in effectiveness when social reinforcement was added while the addition of reinforcement to the video-tape resulted in much less increase in power and in

the case of the audio-tape condition, reinforcement had virtually no increased effect at all. In regard to females, the relative order of effect remained video-tape, audio-tape, and written booklet, though the difference in means between the media appeared to be smaller and again social reinforcement made little difference in the response of audio-tape subjects and of the video-tape treatment group.

On variables B and D which dealt with the time in seconds which subjects spent viewing "alternative" and "outcome" slides, no significant F's resulted. Once again, however, the considerable increase of power attained when social reinforcement was added to the written booklet condition was apparent. In the case of both males and females, on variable B, this treatment moved from the least to the most effective with the introduction of social reinforcement. The only barrier which kept this shift from attaining statistical significance as an interaction effect seemed to be the movement in the reverse direction by the audio-tape treatments. Apparently, these trends statistically cancelled each other out. Results from variable D portrayed in Table 8 were similar with the exception that the written booklet did not increase its relative position in power among females in spite of the increased effect given it by social reinforcement. It did, however, again move from the least to the most effective with males.

Variable F, from the Personal Problem-Solving Situation, and variable H in the Hypothetical Problem Situation are analagous criteria in that they are both measures of the number of alternatives to which some consideration is given by the subject. No F ratios of desired significance are reported in Table 9 relative to variable F. However, a close study of the data in Table 8 shows the same pattern of reinforcement effects in regard to female subjects on variable F as occurred in the case of both males and females in regard to variable A, and to a large degree in the case of variables B and D as well. Specifically, this pattern involved a substantial increase in the effect of the written booklet treatment with the introduction of

reinforcement much less or no increase in the case of the video-tape medium and a decrease in the effect of the audio-tape strategy when reinforcement was introduced. Though this pattern did not hold in the case of male subjects on variable F, the reversal was minimal.

A significant sex x media interaction ($p < .10$) was one of two F ratios reaching the desired level of significance in the data from variable H appearing in Table 9. Contributing to the sex x media interaction were the apparent greater effectiveness of a video-tape strategy for males in contrast to females and a similar advantage for the written booklet strategy for females when compared to males. The effects resulting from the written booklet approach appeared to contribute little to this interaction. A main effect of media (video > audio or written booklet) approached but did not achieve the desired level of statistical significance ($p < .25$). A significant ($p < .10$) second order interaction effect on variable H revealed a pattern of opposite effects for males and females when reinforcement was added to each of the three treatment media. That is, on this variable whenever the effect of reinforcement upon a particular medium was positive for males, it was negative for females and vice versa. The effect of reinforcement was positive for females with regard to video-tape and positive for males in the case of audio-tape and written booklet strategies.

Variable G was devised to tap the degree of consideration given to alternatives by subjects in the Personal Problem-Solving Situation. Data from this criterion appearing in Table 9 revealed that the second order interaction was significant at the $p < .10$ level. Opposite effects in the case of each sex from adding reinforcement to each medium characterized this interaction. In the case of male subjects, the video-tape treatment

strategy appeared to carry more effect when not combined with social reinforcement while the reverse was true with females exposed to the same medium. The effect of reinforcement upon the audio-tape strategy was also reversed dependent upon sex, the effect being positive with males and negative with females. The interactions with regard to both variable G and variable H were thus found to be in the same direction. Finally, the written booklet decreased in effect among males with the addition of reinforcement and increased substantially among females with the same addition.

No F ratios of significance appeared in the data from variable I. All the treatment strategies seemed quite similar in their ability to bring about a decrease in the number of written requests for assistance in problem-solving training. Data trends on this variable differed from those on other variables in that the social reinforcement procedure with a written booklet did not appreciably increase the effect of such a strategy with either males or females. The same can be said for the audio-tape strategy with regard to females but not with respect to males where the opposite seemed to hold true. That is, while the effect of the audio-tape treatment among females showed the customary decrease with the introduction of social reinforcement, it increased, though not significantly, among male subjects when social reinforcement was included. With respect to the video-tape strategy, reinforcement brought lower scores among male subjects and slightly increased scores on this variable among females.

Summary of Results. Data resulting from nine dependent variables have been reported. No one treatment medium with or without reinforcement procedures was found to be superior with either males or females on all of these criteria. Rather the most effective treatment seemed to vary depending on the particular behavior being investigated and the sex of the subjects. When the scores of the live lecture and baseline control subjects were

compared, they were found to be not significantly different on any of the criteria. Subsequent to these analyses, these two treatment groups were combined to form a pooled control group. The mean score of male and female subjects in this pooled control group was compared with the mean score of male and female subjects in each of the competing treatments through t-test procedures analyzing parametric data on eight criteria. In the case of one criterion, variable E, chi-square non-parametric procedures were employed to make similar comparisons. Relative to the competing treatments, the scores of subjects in the pooled control group on the dependent variables varied substantially from criterion to criterion. Of the 48 t-ratios obtained, 16 reached desired levels of significance. Three of these were in the hypothesized direction while the remaining 13 were in the opposite direction. The three hypothesized differences at desired levels included the video-tape with reinforcement strategy on variables C ($p < .10$) and D ($p < .10$) and the video-tape without reinforcement strategy on variable D ($p < .10$) proving to be significantly superior to the pooled control condition. The pooled control condition appeared more effective than the video-tape without reinforcement condition on variables B ($p < .10$), and F ($p < .05$) and more effective than the same medium with reinforcement on variable B ($p < .10$). Similarly the pooled control condition proved more powerful than the audio-tape without reinforcement approach on variables F and G ($p < .05$) and than the same approach with reinforcement on variables B and G ($p < .10$). With regard to comparisons with the written booklet approach without reinforcement, the pooled control scores were higher at the $p < .10$ level on variable D, at the $p < .05$ level on variables F and C, and at the $p < .01$ level on variables A and B. However, only on variable F ($p < .10$) were pooled control scores significantly higher than the written booklet utilizing reinforcement.

The findings reported here should be interpreted with extreme care. Operating with the desired level of significance set at $p < .05$ and making the assumption that all the means reported were random samples from the same population mean, one would expect close to five t-tests to be significant merely as the result of chance. In the analyses reported above, while 16 t-tests were significant, only three were in the hypothesized direction. Thus, while it may be the case that the particular t-tests found to be significant may be the results of experimental efforts, they may also be the result of chance factors, replication being the major recourse for validating these results.

In order to more precisely gauge the effect of the sex, media, and reinforcement independent variables, a three-way analysis of variance (sex x media x reinforcement) was carried out on each of eight dependent variables. No main effects of sex were found to be significant at less than the 10 percent level, though on variable A, desired levels of significance were approached ($p < .25$). In terms of reinforcement main effects, data on variable H were found to be significant ($p < .05$) in that strategies containing social reinforcement proved to be of greater effect than strategies not employing the procedure. The only main effect of media found to be significant ($p < .10$) was on data for variable C, though a trend ($p < .25$) was observed with regard to data on variable H. In both cases, video-tape produced the greatest desirable increases in subjects' responses while audio-tape and written booklet strategies were less effective and about equal to one another. Of 32 interactions computed, four were found to be significant at desired levels. Thus, as noted above with regard to the t-test analyses, extreme caution must be used in interpreting these findings. Of the eight interactions involving sex x media and reinforcement c media one interaction of each type yielded an F ratio of a desired significance level ($p < .10$). The former occurred on data for variable H, with the major contributors being the greater

effectiveness of video-tape strategies with males than with females and the higher effect of audio-tape treatments with females than with males. Results associated with the written booklet strategy on this variable did not contribute to the interaction. The significant reinforcement x media interaction found in data from variable A was apparently the result primarily of the ineffectiveness brought about in the written booklet treatment from the addition of reinforcement. The addition of reinforcement in the case of video-tape and audio-tape treatments results in substantially less shift in effect. Finally, one second order interaction at less than the 10 percent level was analyzed in data from variable G and one from data on variable H. Both of these involved essentially reversed effects on the basis of sex of adding social reinforcement to each of the treatment media. Whenever the effect of reinforcement was positive for one sex, it was negative for the other sex and vice versa. With regard to the second order interaction found on variable G, video-tape and audio-tape strategies contributed in a roughly equal degree to this interaction. In contrast, the written booklet results indicated a large shift in effect among females as a result of reinforcement with a negligible negative shift among males. Relative to the second order interaction associated with criterion H, the reversed shifts among the sexes due to the effects of reinforcement were of roughly analogous magnitude in the case of each training medium. All the results reported here are discussed in the next section of this report. Initially, the discussion of results will center around the hypotheses stated in Chapter II and subsequently, it will explore reasons for, and factors contributing to the results obtained.

Discussion

Prior to a more general discussion of the results just reported, those which relate specifically to the hypotheses stated on page 65 will be discussed.

Video-tape with Reinforcement vs. Competing Treatments. Little evidence was gleaned from the data which would support the hypothesis that a video-tape strategy employing social reinforcement procedures would result in higher scores on all criteria than would any competing treatment. On variables C and D, the video-tape with reinforcement treatment did tend to have a significantly greater effect ($p < .10$) than did the pooled control treatment (cf. Table 3), but on only variable C was its effect superior to that of all other competing treatments. On variable D, video-tape with reinforcement as a strategy was second to the video-tape without reinforcement treatment in terms of greatest effect. In reality, no one treatment was shown to be superior irrespective of the criterion problem-solving behavior in question or of factors such as subject sex and the presence of social reinforcement. A study of Tables 3 and 8 shows that several different treatments were highly effective depending on the particular problem-solving behavior, the sex of the subject, and whether or not reinforcement procedures were included.

Effects of Reinforcement. Hypothesis two which postulated that treatments employing social reinforcement would always have greater effect than those without it was supported only by some data from variable A. Table 8 indicates that on this variable, the addition of reinforcement brought significantly ($p < .05$) more positive results. A trend ($p < .25$) toward such a result was also found on variable C. On most variables, the introduction of reinforcement procedures increased the effect of the video-tape and the written booklet treatments, but was often detrimental to the

effect of the audio-tape condition. Data from variable A revealed a sex x reinforcement interaction ($p < .10$) indicating that the positive effect of social reinforcement was largely felt among female subjects (cf. Table 8). Variables A and C were criteria of prime interest in the investigation, however, thus such data should be given considerable weight. Thus, treatments utilizing reinforcement proved superior, not, as was hypothesized, on all criteria but rather on those criteria quite closely related to the behavior for which the reinforcement was provided.

The Effect of Variations in Media. It was hypothesized that the order of media effectiveness would consistently be video-tape, audio-tape, and written booklet in order of decreasing effectiveness. Data from variable C provided some support for hypothesis three. The media effect ($p < .10$) found here was the result of video-tape treatments having a greater effect than audio-tape strategies, which in turn had a greater effect than written booklet approaches. A trend ($p < .25$) similar in nature was found in data from variable H. In the latter case, the finding was largely due to the high scores of male subjects in all treatment groups, whereas in the former case the result was attributable to the scores of both male and female subjects except in the case of the written booklet with reinforcement condition, where male subjects scored higher than did female subjects. Thus, on only two of nine dependent variables did video-tape, audio-tape and written booklet strategies tend toward the hypothesized order of effect. Therefore, the directional prediction of Hypothesis three was not supported.

Written Booklet vs. Audio-Tape. Written booklet and audio-tape strategies produced effects not significantly different from one another on each criterion. The effect of written booklet and audio-tape approaches appeared upon inspection to approach differences reaching the desired levels of statistical significance on a number of criteria. However, when standard

deviation statistics were taken into consideration such differences proved to be not significantly different. Examples of such instances can be found in Table 8 on variable C among males and on variable F among females exposed to strategies containing social reinforcement. Only on two variables, A and C, did the data indicate that the effects of the written booklet and audio-tape had different effects at, or less than, the 10 percent level. This was indicated by the main effect of media which reached the desired level of significance on variable C ($p < .10$) and in the reinforcement x media effect which reached a desired level of significance ($p < .10$) on variable A. Notwithstanding these two findings, the preponderance of evidence indicated that in the case of seven of the nine dependent variables, the two approaches, audio-tape and written booklet, produced effects not significantly different from one another.

Lecture vs. Baseline Control. The hypothesis asserting that the lecture treatment would possess greater effect than the baseline control treatment which involved exposing subjects to programmed statistics materials received no support. t-test procedures on each of eight variables resulted in no significant differences at the desired levels between the two groups (cf. Table 3). Chi-square data from variable E also indicated this lack of differences. The groups were subsequently combined into a pooled control group.

Summary of Support for Hypotheses. Of the five major hypotheses set forth prior to the investigation, none received substantial support. In contrast to the lack of support uncovered for the major hypotheses, a number of findings, primarily interactional in nature provided valuable information which will be discussed in the remainder of this chapter. In addition, these results have implications for the development of a training program for personal problem-solving behaviors, a topic which will be considered in Chapter IV.

Effects of Lecture and Baseline Control Groups. The lack of difference found between the results of subjects in the lecture and baseline control groups was not expected. An attempt has been made to provide a lecture having a wide variety of interesting oral examples and to utilize a dynamic forceful individual as lecturer. In contrast, the baseline control subjects dealt with written materials on descriptive statistics and it was expected that the mode and the content of these materials would lend themselves to measuring baseline pre-post changes in the subjects in terms of the criteria employed. A comparison finding equally unexpected was the fact that both the lecture approach and the programmed statistics strategy fared rather well in comparison with the competing treatments on most criteria. While several plausible explanations can be offered for the fact that the live lecture approach elicited results to those of the competing treatments, few can be offered for the quantity of problem-solving behavior manifested by subjects exposed to the programmed statistics materials.

It might be postulated that some features of the programmed materials were found stimulating, such as the programming format itself or the content of the materials which involved solving sample statistical problems drawn from the practical situations and answering questions related to these examples. It might also be possible that such a treatment heightened the subjects' sensitivity to a need for assistance in personal problem solving and that they subsequently were particularly prepared to "learn" during the criterion phase of the investigation. During the treatment session, several subjects in the group exposed to programmed statistics materials expressed their dissatisfaction with the materials to which they were exposed, saying that they did not feel the statistics exercises provided any help in personal problem solving. As a result, this treatment experience may have heightened the desire of such subjects for assistance, or in some other way increased

their receptivity to the criterion experiences which were most certainly relevant to personal problem solving. However since this condition functioned as a baseline control the criterion behaviors occurring among these subjects must be considered as the quantity normally occurring and no statement can be made regarding supposed effects of this treatment.

t-test Comparisons. Results of t-test procedures on variables B and D presented an important paradox. Data from variable B showed that subjects from the pooled control group expended a greater number of seconds viewing each slide they selected from the "alternative" category than did subjects in four of the six competing treatments. With regard to variable D, however, only subjects from the written booklet without reinforcement conditions spent a fewer number of seconds viewing each slide they selected from the "outcome" category than did individuals in the pooled control group. A plausible explanation can be advanced which would account for such apparently conflicting findings since the nature of the two categories of slides under consideration was different. With regard to the "alternative" slides, there were six slides involved and each one presented one possible solution to the hypothetical problem. In contrast, each of the 12 slides dealing with "outcomes" contained considerably more information and in a different form. In addition, "outcome" slides were of two types, possible positive and possible negative outcomes for each of the six alternative solutions; and each slide presented several possible outcomes possessing varying probabilities of occurrence. The outcomes and the subjective probability of occurrence of each alternative had to be weighed against each other and against possible consequences and probabilities presented in other slides. Further, each subject had to contrast outcome information against additional information available concerning the problem and the problem solver. One possible ramification of these differences between

the two slide categories might have been that the sophisticated well-trained problem solver tended to look at more "alternative" slides (but would give relatively little time to such slides) than did an individual with less training. This would be the case due to two reasons. He might have been able to process faster the small amount of information presented, consequently giving few seconds of attention to the short expository statements found on the "alternative" slides. A second possible ramification might have been that he tended to give longer consideration to each "outcome" slide he chose, because he had knowledge that information in this slide category involved the more sophisticated aspect of the problem-solving process, such as studying the possible positive and negative outcomes resulting from the implementation of these alternatives. In other words, it is postulated that he knew that it was the information about possible outcomes that made the difference in which alternative was chosen, not the simple statement presenting the various alternatives. Utilizing this line of reasoning, the t-test findings from variables B and D would be expected to occur and would present no paradox. An extended discussion of the data from these two variables has been attempted not primarily because the results of the variables were the reverse of one another but because the results obtained presented a rather unique paradox in terms of what might have logically been expected if this difference had been recognized before the study was initiated.

The lack of significant results on variable I may have been partially due to the criterion measurement phase of the investigation acting as a treatment in the case of the baseline control group. While the baseline control group received irrelevant materials during the treatment period, their experience of working in the simulated problem-solving situations may have contributed to the rapid formation of perceptions that they

were receiving assistance in problem solving. Subsequently, these subjects would also have made fewer requests for assistance at the end of the investigation than they had made earlier. This paralleled the tendency of subjects in most of the other treatment groups and resulted in no treatment being significantly more effective than any other in reducing the number of requests for problem-solving assistance. To a lesser degree, the possible confounding effect of criterion measure administration also might have applied to the results from variable H. Aside from all the problems inherent in self-report data, if such a measure is used in future research of a similar nature, it would be advisable to obtain a measure of change in self-reported behaviors prior to the administration of any criterion measures that might have a training impact on the subjects.

Chi-Square Analyses. The failure of data from variable E to provide any statistically significant findings might have been due to the weak way in which the criterion was structured. Each individual had a 50% opportunity for making an acceptable response. Adequate measurement of personal problem-solving behaviors must take into consideration the solutions or products of problem solving, but more rigor must be employed in such measures. This could be accomplished by manipulating the available information to make the specific alternative solutions scalable in appropriateness in order to get sufficient discriminative power to separate well-trained from less well-trained problem solvers. In its present form, this criterion showed no significant difference among the number of subjects in each treatment group who selected one of the acceptable solutions to the problem presented in the hypothetical problem simulation. It is assumed that such differences might have been revealed by a more sensitive instrument.

ANOVA Main Effects. The two largest F ratios in terms of reinforcement main effects resulted in data from variables A and C. Both of these variables involved some of the more simple problem-solving behaviors under investigation, (i.e., number of slides viewed from two categories). One possible explanation of such results is that reinforcement might have been substantially more effective in increasing the sheer number of rather simple responses but less valuable in producing more complex responses such as the time emphasis given to certain types of slide. Perhaps an even more likely explanation is the fact that in the reinforcement procedures, each subject was asked whether or not the social model should review additional alternatives. If a subject responded in the affirmative, then social reinforcement was provided. Since the reinforcement was provided in a manner directly connected with reviewing more alternatives, it should have been anticipated that its biggest effect would have been on this criterion behavior. Further, the most logical area of generalization for such an effect would have been on a similar behavior like the one involved in variable C. The results relative to variables A and C in Table 9 are clearly accounted for by such an explanation. In future efforts when an increased effect due to reinforcement is desired, it may well be that more of a direct connection must be made between the reinforcement and each specific behavior reinforced.

On the topic of media main effects, the media in this investigation were not only parallel or comparable but tightly dependent on one another. The audio-tape and written booklets were actually sound track replicas of the video-tape. Such an interrelationship could have worked to the disadvantage of the media. Of course, numerous improvements could have been made in the video-tape and it could be argued that it was in and of itself weak in its potential effect. However, equally plausible is the postulate that the audio-tape and written booklet approaches were handicapped by

having to conform unerringly to the content of the video-tape. Scores on media might have been just as comparable even if they had differed in content. In fact, to make the media as strictly parallel as was done in this investigation may have ignored some of the individual strengths of the media in question and actually blunted their effectiveness, causing a leveling effect across media. Designing the most effective written booklet, for example, might not involve simply typing a verbatim script of a video-tape production. Thus, the one F ratio reaching a desired level of significance (i.e., on variable C) might have been in spite of the blunted effects of the media rather than because of their individual differences in effectiveness. If the above explanations are valid, they might also explain the lack of F ratios reaching desired levels of significance relative to the main effect of sex.

ANOVA Interactions. The consistent lack of F ratios at the desired levels of significance relative to the factor of sex was also evident on the interaction data portrayed in Table 9. Of 16 possible interactions involving subjects' sex, only one, a sex x media interaction on variable H reached a desired level of significance ($p < .10$). The explanation most strongly suggested by the data is that sex is indeed not a learner characteristic that has a significant impact on the training of these behaviors. However, it also seems possible that sex effects did indeed exist but were masked by some of the confounding factors discussed earlier with regard to main effects.

It must be pointed out that the interaction on variable H which did attain a desired level of significance could well have been the result of chance factors. If such chance probabilities are ignored, a study of the nature of the interaction makes another inference plausible. It may have been possible that among males the dramatic nature of the video-tape and

audio-tape presentations influenced subjects' self-reporting of problem-solving behaviors. In data from both the with and without social reinforcement conditions, the order of media effect among males was clearly videotape, audio-tape and lastly, written booklet. On this variable at least, it seemed to support the notion that dramatic and audio-visual stimulation is necessary to hold the attention and interest of male subjects, possibly because of the aversiveness reading may have for many of them. Without social reinforcement, the order of media effect was completely reversed from that among males, and the addition of reinforcement did not fully bring that order of effect into line with that found among male subjects. The finding that the written booklet was a much more powerful approach with females would support the notion that girls are more likely to react favorably to written material and do not need the rather dynamic approach which seemed to be more effective with boys. It could further be argued that variable H was closest to students' real-life problem-solving performance than any of the other criteria derived from simulations. Thus the results on this variable would have particular importance.

The second order interaction associated with variable H was very difficult to interpret. Without the visual component in the presentation, the females seemed to respond better without reinforcement being added to the treatment. Only reasoned speculation can be offered as a tool for discovering possible causes of such a result. The above second order interaction may have been the result of a negative reaction to interruptions in the presentation. Such results also could have been due to sex differences in attention span or the degree of identification elicited by the listening and reading approaches. For example, female subjects may have been more used to reading stories about people of their own age. Also, while they perhaps were more used to interruptions in a visual presentation, because of their

experiences viewing television commercials, female subjects may have experienced more resentment toward the interruptions occasioned by reinforcement procedures injected throughout the listening or reading experiences.

Similar difficulties in interpretation surrounded the other second order interaction found in Table 9. On variable G the introduction of reinforcement was positive in the case of video-tape among males, and the same addition to video-tape brought about a decrease in effect among females. No plausible explanation can be offered for these results at present. Variable G dealt with the pattern of information selection in the Personal Problem Simulation and points were awarded in this criterion on the basis of both the number of alternatives about which some information was selected and the amount of information investigated about each selected alternative (cf. Appendix K). It seems possible that the giving of reinforcement to subjects for verbally stating that the social model should consider more alternatives was effecting in a rather oblique manner the pattern of information selection being made by subjects in the Personal Problem Situation. This effect, whatever its precise nature, was rather consistent but was reversed between the sexes (cf. Table 8).

The final interaction to be accounted for appeared in data from variable A. The written booklet clearly benefitted more than did any other treatment from the addition of social reinforcement procedures. This same effect was noted to a lesser extent in several other instances, especially on variable C. Such results could well have been due to benefits resulting from the breaking up of extensive written material with pauses and brief changes of activity. Under such conditions any negative reactions subjects might have had to extended reading activities might have been minimized.

Additional Potential Influences upon Results. The possibility that the nature and content of some criteria used in the investigation exerted a confounding effect upon the results has been noted earlier. In addition, other factors associated with the study may have contributed to the specific results obtained. For example, the necessity of administering all criterion measures in a single session may have affected the responses of subjects. Particularly when simulations were included, the level and length of concentrated effort which was required of each subject might have resulted in boredom, random or negative responses. This concentration of criterion administration might have introduced a leveling or equalizing effect across treatment conditions which would mask the superiority of a particular treatment. Perhaps an additional plausible postulate for artificial changes in problem-solving behaviors was that some subjects increased their effectiveness due to the freshness of the concepts and material presented as part of the criteria and due to transfer of learning from one criterion task to another. At the same time, the performance of other students might have deteriorated due to fatigue or loss of interest. The latter effect might have been particularly true of bright subjects who grasped the concepts and behaviors early in the training experiences and who viewed much of the subsequent training and criterion experiences as redundant and boring. Another possible factor confounding the results for the control subjects is one that was noted earlier. Many of these subjects might have perceived during the criterion phases of the investigation that they were finally getting the help they requested and were through with what appeared to be the boring materials given to them during the training itself.

One element (i.e., the script) was held in common by six of the treatment strategies. It might have been that the script itself was inadequate from the standpoint of clarity or interest stimulation. This "weak link" in the treatment "chain" might have made a significant contribution to a sparseness of significant results at the desired levels. Other possible limitations in this study might have been that inappropriate criteria were selected for the problem-solving skill areas of concern or the criterion instruments employed might have been inadequate in their sensitivity to the incidence of the specific behaviors related to the selected criteria. Table 10 reports the intercorrelations among all the criterion measures employed in the study. While possible issue of whether or not the most appropriate criterion measures were formulated and employed is a question for further investigation, an intercorrelation matrix of all nine dependent variables revealed that the variables were indeed for the most part measuring different things. The highest intercorrelation between variables is found between the number of slides presenting possible outcomes of alternative solutions which were viewed by the subject (variable C) and the relation between the number of seconds spent viewing such slides and the total number of seconds spent viewing slides of any kind. The prime contributor here is of course that in most cases the greater number of "outcome" slides watched by the subject, the greater amount of his total viewing time was spent viewing outcomes. This is then a natural relationship between these two variables. Much the same can be said of the .712 correlation between the two parallel criterion measures concerning alternative solutions in the Hypothetical Problem Simulation, (variables A and B). Some outcomes of criterion measures have already been noted and suggestions for improvements in them and in the statistical procedures employed will be made in Chapter IV.

Table 10

Intercorrelations of Nine Dependent Variables

Dependent Variable	A	B	C	D	E	F	G	H	I
A. Number of viewed slides presenting a possible alternative problem solution.	1.000	.712	.590	.483	.156	.096	.040	.147	.059
B. Time given to slides presenting alternatives in relation to total time viewing all slides.	.712	1.000	.118	.172	.108	.168	.069	-.020	.025
C. Number of viewed slides presenting information on the possible outcomes associated with the implementation of particular alternatives.	.590	.118	1.000	.870	.092	.022	.026	.085	.026
D. Time given to slides presenting information on the possible outcomes of alternatives in relation to total time viewing all slides.	.483	.172	.870	1.000	.067	.016	.020	.052	.025
E. Rated appropriateness of the alternative selected as "best."	.156	.108	.092	.067	1.000	-.062	-.088	-.054	.001
F. Number of hypothetical individuals (i.e., alternatives) about whom some information was selected.	.096	.168	.022	.016	-.062	1.000	.814	.287	.198
G. Rated efficiency of information packet selections within and across hypothetical individuals (i.e., alternatives).	.040	.069	.026	.020	-.038	.814	1.000	.267	.143
H. Net increase (i.e., pre- and post-treatment) in each subject's self-reports of desirable personal problem-solving behaviors.	.147	-.020	.085	.052	-.054	.287	.267	1.000	.502
I. Net decrease (i.e., pre- and post-treatment) in the number of written requests for assistance with personal problem-solving behaviors.	.059	-.025	.026	.025	.001	.198	.143	.502	1.000

Only two other intercorrelations indicate more than 25% of the variance in scores on any two variables being held in common by these variables. One of these, a .59 intercorrelation, indicates an association between the number of "outcome" slides and the number of "alternative" slides viewed by each subject. The other such intercorrelation (.50), indicates that the criterion measure assessing the changes in the self-reported problem-solving behavior of each subject and that measure assessing the change in the number of written requests for problem-solving assistance made by each subject, (variables H and I), may to some degree be measuring the same things. This correlation is probably due to the fact that certain types of responses to some of the statements on the Checklist for Solving Problems in Real Life were used in the formulation of both criterion measures. Despite the particular intercorrelations discussed above, it appears that each of the dependent variables does measure a separate phenomenon. It should be noted that no test-retest reliability estimates are at present available, however. Some outcomes of criterion measures have already been noted and suggestions for improvements in them and in the statistical procedures employed will be made in Chapter IV.

An attempt has been made in this chapter to present a concise review of the results obtained in this investigation including their relationship to the hypotheses proposed prior to the study. Subsequently, several plausible explanations for, and factors influencing, these results have been discussed. Chapter IV in addition to summarizing the investigation will focus on conclusions and implications which might be drawn from these results.

IV. SUMMARY, CONCLUSIONS, AND IMPLICATIONS

Summary

Problem

Problem situations (i.e., those situations in which the appropriate or optimal response is not immediately obvious) are frequent and recurrent throughout life. A wide variety of events, internal and external to the individual, have been hypothesized to occur when a person faces such situations. Until the past decade relatively little consistent or programmatic effort was expended in thorough exploration of problem-solving behavior. From a historical perspective, Gestalt psychology, the psychometric movement, research in human learning, and information processing theory including work in computer simulation have been major influences upon both the theorizing and research carried out in relation to human problem solving.

Guidance has often been viewed as having a major responsibility in American education for assisting young people to be effective personal problem solvers. Guidance programs have been charged with this responsibility primarily due to inferential evidence which has implied that adverse effects befall people with inadequate problem-solving skills, especially in a rapidly changing, cognitively complex society such as our own where the quantity and difficulty level of the real-life problems confronting most individuals have rapidly increased. However, the abundance of previous research in human problem solving has been predominantly laboratory-oriented and has dealt primarily with problems far removed from the real-life choice situations of daily life. In addition, and perhaps not unrelated

to this research deficit, is the fact that a study of guidance-oriented research suggests that there has been inadequate progress toward the priority goal of guidance, assisting individuals to become effective personal-problem solvers.

Rationale and Strategy

Substantial evidence can be marshalled to support the notion that human problem-solving behavior is learned and is, therefore, subject to modification through training. Since the prime interest in this study was the development of techniques for training individuals to utilize effective problem-solving behaviors, the initial strategy was to study available models of problem-solving behaviors in order to ascertain what behaviors were involved in the process and to examine attempts to train these or similar behaviors. Such an investigation revealed six rather basic skill areas related to problem solving in real life, each of which was composed of several more specific behaviors. Previous efforts to train these and similar behaviors seemed to focus on educational and vocational decisions to the virtual exclusion of other life areas. Evaluative data on the effectiveness of the efforts were rare; they lacked clear objectives, specific facilitative learning experiences and criterion measures directly related to their objectives. Individual research studies proved somewhat more useful in producing specific problem-solving behaviors. Clues were gleaned from such studies which provided indication of what psychological and physical factors effect human problem solving and what might be some potential training strategies worth exploring. Representative examples of such strategies involved social modeling, the use of reinforcement, and direct exhortative approaches. The research in this area of investigation,

however, was anything but systematic and research findings were isolated and often apparently unrelated to one another. The necessity of measuring problem-solving behavior has brought about great controversy, with the controversy revolving around a product vs. process dichotomy. Some researchers suggested that it was the solution arrived at, or whether or not the solution worked, that determined the quality level of the problem-solving skill; while others stoutly maintained that it was the process that was of importance, not the chosen solution or the ultimate results of problem solving. The few available instruments designed to measure problem-solving behaviors reflected this controversy. They tended to weight the problem solution selected by subjects as more important than the process subjects used in selecting a solution, though attention was sometimes given to one or two process behaviors. No available instruments came very near to assessing both how individuals dealt with problems in their own lives and the nature of the problem solutions. However, it was accepted as a basic premise in this study's rationale that an adequate measure of real-life problem-solving behaviors must concern itself with both process and product.

Design

A problem-solving skill postulated to be of key importance (i.e., the consideration of alternative problem solutions prior to making a decision) was selected for an exploratory investigation aimed at providing direction for optimal training strategies for a proposed problem-solving training program. Specific questions under investigation included: (1) Which medium of presentation (video-tape, audio-tape, or booklet) is the most effective? (2) Does the addition of social reinforcement procedures during training heighten the effectiveness of a treatment regardless of the medium employed?

(3) Is there a differential effect of particular treatments dependent on the sex of the subject being trained? Eight treatment groups were formulated including video-tape social modeling, audio-tape social modeling, and a modeling strategy utilizing written booklets. Three treatments parallel to these except that they incorporated social reinforcement of desirable subject verbal statements during training were also employed. In addition, there was a condition in which subjects received a live lecture on the topic and a control treatment in which subjects were exposed to programmed materials on descriptive statistics.

Criteria

A total of three criterion devices yielding nine criteria were derived from two problem-solving simulations and a self-assessment device. In the first of these simulations, the subject's task was to assist a hypothetical individual to solve a real-life problem. Information concerning the problem, the problem-solver, alternative courses of action that could be taken, and the possible outcomes of implementing the various alternatives were available on 35mm slides. For 10 minutes subjects were free to view whatever they felt would be the most useful slides for solving the problem. At the end of that time, they were asked to indicate which alternative course of action they felt the hypothetical character should take. In the second simulation each subject was given the task of selecting one of a number of available individuals to assist him in solving a current life problem of his own choosing. Information on these hypothetical individuals was made available through photographs and tape cartridges placed in information packets. Subjects were faced with a 10-minute limitation. Subjects were asked at the conclusion of that time to indicate which individual they had chosen to assist them. Following this simulation each subject filled out the self-report device noted earlier. Criteria derived from the first simulation in which each subject assisted a hypothetical person to solve a personal problem

included: (A) the number of slides viewed by the subject presenting alternative problem solutions, (B) the time given to slides presenting alternatives in relation to the total time viewing all slides, (C) the number of slides viewed by the subject which presented information on the possible outcomes of implementing various alternatives, (D) the time given to slides presenting possible outcomes of alternatives in relation to the total time viewing all slides and, (E) the rated appropriateness of the solution selected as "best," (the available information was manipulated in such a manner as to make three of the six possible alternatives quite acceptable).

From a second problem-solving simulation in which each subject was to select an individual to assist him in solving a personal problem of the subject's choice two more criteria were derived. The criteria were (F) the number of alternative individuals about whom some information was selected and (G) a measure of the amount of information on each alternative which was considered. Finally, two further criteria came from a readministration of a self-evaluative problem-solving behavior assessment device. These criteria were (H) positive changes in self-reported problem-solving behaviors and (I) net decrease in the number of written requests for problem-solving training.

Hypotheses

1. Subjects assigned to the video-tape with reinforcement treatment will score higher on the criteria than will subjects assigned to any other treatment condition.
2. Subjects assigned to the three treatment conditions involving social reinforcement will score higher on the criteria than will subjects exposed to similar conditions not involving social reinforcement.

3. Subjects assigned to the two video-tape treatment conditions will score higher on the criteria than will subjects assigned to the two treatments involving written booklets or to the two treatments involving audio-tape, or to a treatment involving an oral lecture, or to the baseline control condition.
4. Subjects assigned to the two audio-tape treatment conditions will score no differently on the criteria than will subjects assigned to the two treatments involving written booklets.
5. Subjects assigned to the oral lecture treatment condition will score higher on the criteria than will subjects assigned to the baseline control treatment.

No interactions between media, the use of reinforcement, and the sex of subjects were hypothesized.

Experimental Procedures

In a suburban San Francisco Bay Area high school, all eleventh graders responding positively to a device designed to assess their need and desire for problem-solving training formed a pool from which 128 students were randomly assigned by sex to one of the eight treatment conditions noted earlier. Convening in separate rooms within the high school counseling suite at various times during a four-day period, each group received the same opening and closing remarks prior to, and after, the administration of its treatment procedure. Approximately one week following completion of treatment administration, collection of criterion data was begun. Students were summoned individually on a random basis and were exposed to all three criterion measures within a 30-minute period. This phase of the investigation consumed a total of eight school days. The problem-solving simulations were followed by second administration of the Checklist for

Solving Problems in Real Life. In the first of these simulations, the subject's task was to assist a hypothetical individual to solve a real-life problem. Information concerning the problem, the problem-solver, alternative courses of action that could be taken, and the possible outcomes of implementing the various alternatives was available on 35mm slides. For 10 minutes subjects were free to view whatever they felt would be the most useful slides for solving the problem. At the end of that time, they were asked to indicate which alternative course of action they felt the hypothetical character should take. In the second simulation, each subject was given the task of selecting one of a number of available individuals to assist him in solving a current life problem of his own choosing. Information on these hypothetical individuals was made available through photographs and tape cartridges placed in information packets. Subjects were faced with a 10-minute limitation. Subjects were asked at the conclusion of that time to indicate which individual they had chosen to assist them. Following this simulation, each subject filled out the self-report device noted above.

Data Analysis and Results

BMD 07D was run initially in order to secure a check on the accuracy of the data recorded. This program provided, in addition to means and standard deviations, histograms and ranges for each treatment group of each criterion measure as well as a one-way analysis of variance on each criterion. Subsequent to this preliminary analysis, due to the dicotomous distribution of data on variable E, these results were dealt with separately via chi-square techniques. t-test procedures were employed to compare the effects of the lecture group and the baseline group on each of the remaining measures.

Since no significant differences on any of the criteria appeared between these two types of control groups, a "pooled" control group composed of these two treatment conditions was used. Analyses included a comparison of mean effects of the pooled control with those of each of the remaining treatments on each criterion measure through further t-tests. Finally, three-way (sex x reinforcement x media) analyses of variance which sought to uncover significant main effects and interactions involving these three factors were conducted on data from all treatments except the pooled control.

Even when desired levels of significance were set at $p < .10$ and $p < .05$, results produced little support for the five hypotheses. Regarding hypothesis one, (i.e., that subjects assigned to the video-tape treatment will score higher in the criteria than those assigned to any other treatment), on only two of the nine criteria was any support obtained, though one of the measures (i.e., the number of slides viewed by the subject which presented the possible outcomes associated with various alternatives), on which some support was indicated was one of the criteria of prime concern in the study. Somewhat more supportive evidence was uncovered with respect to hypothesis two, (i.e., that subjects assigned to treatments employing social reinforcement procedures would score higher on the criteria than would subjects in similar treatments not employing social reinforcement). On data from the prime criterion of interest, the number of "alternative" slides viewed by the subjects in the first problem-solving simulation, this hypothesis was supported at the $p < .10$ level of significance. On one other measure, the number of "outcome" slides viewed, a strong trend ($p < .25$) in the predicted direction on two criterion measures, (i.e., the number of slides viewed by a subject which presented information on the possible outcomes associated with each alternative and positive changes reported in personal problem-solving behaviors), was uncovered. Though inspection of the data relative to hypothesis four revealed what appeared to be differences of considerable

magnitude, on only one variable, (i.e., the number of slides viewed by the subject which presented possible outcomes associated with each alternative, did the difference reach a desired level of significance. Finally, t-test procedures comparing the live lecture strategy with the baseline control group provided no support for hypothesis five. Though on a majority of criteria the lecture group appeared to be superior, these differences at no time reached the desired levels of statistical significance.

Contrary to what was hypothesized, this study's major findings of significance concerned first and second order interaction effects. On a criterion of major interest, (i.e., the number of slides viewed by the subject which presented alternative problem solutions), a reinforcement x media interaction was uncovered. Higher criterion scores among subjects in written booklet treatment groups when social reinforcement was introduced was the primary element here. The apparently greater effectiveness of the video-tape strategy for males in contrast to females and a similar effect for the written booklet for females in contrast to males contributed to a significant media x sex interaction on variable H, (i.e., the positive changes in self-reported personal problem-solving behavior). Two second-order interaction effects of a similar nature and at desired levels of significance were found. In regard to variable G, (i.e., the rated efficiency of information packet selections within and across alternatives), when reinforcement was added to each medium of training, reversed effects resulted dependent upon sex. For males, video-tape and written booklet seemed more effective without reinforcement, whereas audio-tape was more effective with reinforcement. Opposite effects were noted among females. Finally, opposite effects were also found dependent on sex when reinforcement was added to each media on variable H, (i.e., positive changes in self-reported personal problem-solving behavior). For males, reinforcement resulted in lower scores within the context of a video-tape strategy, and a positive effect in the case of

audio-tape and written booklet media. Again, effects among female subjects were opposite to the results for males.

Conclusions

Initially, conclusions closely tied to the hypotheses originally formulated will be set forth. Following this, additional conclusions felt to be warranted by the data will be presented.

1. With regard to hypothesis one, no one training strategy of those investigated proved to be optimal for helping students to acquire effective problem-solving behaviors. The results of this study both from analyses of variance and from t-test procedures lead to the conclusion that a number of training strategies may be useful in the training of personal problem-solving behaviors. The most useful strategy seems to depend on the context in which it is being used. This involves factors such as the particular behavior to be trained and characteristics (e.g., sex) of the subjects being trained.

2. Providing social reinforcement for desirable verbal participation by subjects during training did have an effect upon some problem-solving behaviors examined by this study, but the pattern of effect was complicated and not entirely consistent. It appeared that the effect of reinforcement was confined to the specific behaviors for which the reinforcement was given and to the behaviors closely related to them. Further, just what was causing such effects cannot be precisely specified. Perhaps the effects which were in the predicted direction were the result of the training presentation being broken up by reinforcement into shorter, more assimilable units of information. Maybe the big factor was that immediate feedback leading to subjects' knowledge of their correct responses was provided by the reinforcement. On the other hand, it might have been that

the human element of having interaction between individuals carried a variety of connotations to the subjects including, perhaps, a perception that they were important enough to be worked with personally in the problem-solving training.

With regard to the consistency and pattern of reinforcement effects, it appeared that the introduction of social reinforcement procedures in response to desirable verbal participation by subjects during training usually had a positive effect upon both video-tape and written booklet approaches and reverse results with regard to the audio-tape on several criteria. In fact, this reversal was often the major barrier to a lack of statistical significance at desirable levels being attained in favor of treatments using reinforcement. While the positive effect of social reinforcement was relatively consistent and substantial when paired with the video-tape modeling strategy, the effect was just as consistent and in several cases, was much more pronounced when paired with the written booklet materials. These results from the analysis of variance procedures and the lack of clarity as to the particular elements in the social reinforcement procedures which contributed to the effects of reinforcement make it necessary to carefully delimit our conclusion. In this light it can be concluded only that the reinforcement procedures did produce an added effect at significant levels upon those specific problem-solving behaviors (e.g., the number of slides viewed by the subject which presented alternative problem solutions which were similar to the specific behaviors for which the reinforcement was administered.

3. No training medium was found to be most effective irrespective of either the specific problem-solving behaviors being assessed or such variables as the use of reinforcement and the sex of the subjects. Thus, like the question of specifying the optimal training strategy, the media

reasons for such a result was the inconsistent efficacy of both treatments. The standard deviations of both approaches were often larger than most, or in some cases all, of the remaining treatments across the criteria. Thus, some people might have benefitted from each of these approaches but their overall effectiveness was reduced because these positive changes were negated by the lack of change, or the negative changes, made by other subjects in these treatment groups, though there may well have been chance fluctuations. It cannot be concluded that the lecture treatment should necessarily be removed from consideration as an effective training strategy. Data from Table 1 indicate that on several variables the lecture strategy was indeed more effective than the control but not at desired levels of significance. Any conclusion relative to this finding must be limited to pointing out that programmed materials in written form on an apparently unrelated subject elicited responses on the dependent variables not significantly different at desired levels from a live oral presentation concerning personal problem solving.

6. Evidence resulting from t-test analysis conducted as an extension of Hypothesis 5 provided findings that proved difficult to explain. The pooled control condition fared well when its effects were compared with those of each of the remaining six treatment groups on each of the eight criteria. It was never least effective, usually of average effectiveness, and once or twice was most effective. Unless such a finding can be adequately explained, the idea of building a training program for problem-solving behaviors would be difficult to support and one should be cautioned against the conclusion that the control strategy was indeed a good treatment strategy. It may well have been the case that the ceiling on the criterion measures was too low. A considerable amount of problem-solving behaviors were exhibited in all of the treatment groups and the criterion measures may have lacked the necessary sensitivity to discriminate between effective and ineffective

problem solvers. In such circumstances the amount of criterion behavior occurring in the control treatment might be comparable in quantity to that occurring within competing treatments. Several suggestions for eliminating this possible deficiency are presented in a subsequent discussion of implications. A related point which has been touched upon previously is that though the live lecture and baseline control treatments did not differ significantly at the desired levels, in effect, the lecture group often did score somewhat higher on several of the criterion measures. Thus, when this condition was pooled with the baseline control condition, a somewhat stronger control group resulted for further comparisons.

Two final conclusions must be made with more reservation than those presented previously. These two additional conclusions are based primarily on data trends.

7. Though there appeared to be differences in treatment effectiveness attributable to sex, most of these did not reach desired levels of statistical significance. In spite of the fact that sex did not produce any main effects at the desired levels of significance, it cannot be concluded that it is of no consequence in training problem-solving behaviors. In studying interaction effects for example, it was revealed that while both video-tape and the written booklet with reinforcement served equally well among males in stimulating more choices of alternative slides (i.e., variable A), the written booklet was easily more effective in stimulating such behavior among females. In one or two instances males seemed to respond to the more dynamic approaches (i.e., video-tape) and often seemed to be less affected by the introduction of social reinforcement procedures. Video-tape proved to be significantly more effective in eliciting positive changes in self-reported personal problem-solving behaviors with males than with females while audio-tape and written booklet approaches were about equally effective with both sexes. Sex is not a major determinant of whether or not a treatment is

effective, but it may interact in subtle ways with social reinforcement and media to produce increases or decreases in particular problem-solving behaviors exhibited by subjects. The interactions found were not hypothesized in advance and would need to be confirmed by further research.

8. We have not yet found any optimal strategy for training effective personal problem-solving behaviors. Either such a strategy does not exist, or it was not included in those strategies implemented in the present investigation, or, if included, the design and instrumentation used in this investigation were not sufficiently sensitive to uncover such a strategy.

Implications

Rationale and Training Strategies.

Subjects in treatments utilizing social reinforcement techniques, especially in conjunction with the video-tape and written booklet, more often attained higher scores on criterion measures than did subjects in treatments not including such reinforcements.

While these findings supporting the usefulness of social reinforcement in problem-solving training were not consistent, sufficient evidence was produced to warrant the further exploration of such procedures in a proposed training program. Is "knowledge of results" the reinforcer, is it social approval, is it frequent changes in activity, or is it the more personal relationship with the experimenter?

The individuals administering the training materials and providing the reinforcement were relatively untrained. No more than an hour or two was spent in explaining to the experimental assistants how to handle the treatment sessions and how to carry through the reinforcement procedures. Possibly in school settings counselor aides or similar para-professionals could handle such a training program in order to avoid involving highly

paid individuals trained at the professional level. The results of this study also seemed to suggest that in order to be effective reinforcement must be closely tied to the specific behavior under investigation. This finding along with the indication that there seems to be no one optimal training strategy for eliciting all problem-solving behavior might suggest that considerable effort will be needed to devise appropriate training strategies to achieve sophisticated and complex problem-solving behaviors. We may need to devise an optimum strategy for each separate problem-solving behavior rather than with attempting to discover one strategy which is best for training all problem-solving behaviors generally.

Additional research is needed into exactly what behaviors contribute to effective personal problem solving. It would be wise to undertake an intensive study of effective and ineffective problem solvers in order to uncover which behaviors differentiate the two groups. Possibly the model of effective personal problem solving used in this investigation needs modifying.

The selection of media for training presentation seems partly dependent upon whether or not reinforcement procedures are included in the training of particular behaviors. It has been previously noted that written booklets rather consistently increased most in effect as a result of the introduction of social reinforcement procedures. Such findings would seem to indicate that written booklets are not to be ignored in future searches for an effective training medium. Written materials invariably are more economically feasible to produce than more involved audio-visual media presentations.

A recurrent issue in the development of almost any training program is the accommodation of individual differences in learning styles by offering a variety of training strategies. If the characteristics of those students for whom each training strategy was effective could be isolated perhaps even

lecture might be an additional useful strategy in an arsenal of strategies designed to meet a wide variety of learner characteristics. The speculation is made regarding a lecture approach however that, relative to other treatment strategies, the lecture might be more useful for stimulating rather simple straight-forward problem-solving behaviors, e.g., looking at several alternative solutions to a problem when they are placed before you) while its use in training more sophisticated concepts, (e.g., studying the possible outcomes of implementing each alternative) might be more questionable.

This investigation's attempt to uncover the effect of sex differences in training has valuable implications. Inspection of the data shows on four measures that the video-tape modeling strategy not containing reinforcement was apparently more effective for males than it was for females. Similarly, five measures revealed an advantage that a non-reinforcement audio-tape approach had with females. Social reinforcement procedures did add to the effect of various treatment strategies. The same procedures might have also produced a tendency toward equalization of treatment effects between sexes. That is, social reinforcement may counter-balance sex effects, thus eliminating the main effect due to sex. In such cases, the main effect due to sex might be insignificant with the sex x treatment interaction still quite significant. Though there is some evidence of this occurring in the present study the instances in which this would and would not be the case should be further identified by future problem-solving research.

The data concerning the relatively high frequency of problem-solving behavior occurring in the pooled control treatment condition must be dealt with. It may be that personal problem-solving behaviors are emitted quite frequently by most students and that actual emission of appropriate behaviors is not the barrier to effective problem solving. Or it may be that the behaviors truly associated with effective problem-solving are not being measured. A third interpretation will suggest a reprint of

of criterion measures to widen the range in the frequency of appropriate behaviors which can be accommodated since the ceiling on the measures employed in the present investigation may have been too low.

Research Design.

A main element of the research design was the manner in which the treatment strategies were designed. One feature, the script, was held in common by six of the treatment strategies used in this investigation. It may have been that the script itself was inadequate from the standpoint of clarity, interest stimulation, organization, or in regard to a number of other variables. This "weak link" in the treatment "chain" would have made a major contribution to a sparseness of results at the desired levels of significance. It may be that the most powerful features of particular training media were muted and the media made more equal in their effect by forcing them to adhere to the same script.

The criterion measures employed in the study may have been inadequate in sensitivity to the specific behaviors being measured. It is also possible that the quality of instrumentation used in implementing the criteria resulted in the measurement of behaviors other than those which would have been most appropriate. One criterion, the selection of an appropriate solution in the hypothetical problem simulation has already been noted in this regard. The behavior itself may be worthy of measurement, but the manner in which the measure was formulated was inadequate. Each subject had a 50% opportunity by chance to score high on the measure.

Criterion measures designed to assess human problem-solving behaviors need to be improved. First, if it is considered important to assess the quality of the problem solution selected by the subject, problem-solving simulations, and (primarily the information available in such situations), must be controlled in such a manner as to make the alternative problem solutions scalable in terms of appropriateness. The instrumentation of the

dependent variable regarding the solution chosen (variable E) included in this investigation was woefully inadequate, the subject having through the very nature of the measure a 50% chance of selecting an appropriate solution. This is a clear example of inadequate assessment procedures being used to measure a very appropriate criterion variable. Second, if any measures of change in self-reported problem-solving behaviors are sought, in future studies the effect of criterion experiences must be partialled out and several data gathering points over time should be included. Third, research on phenomenon such as real-life problem solving almost demands the administration of multiple criterion measures on occasions separated by meaningful time intervals. The administrative necessities which forced a single session of data collection in this study seemed to have an unspecified but confounding effect upon the results. Additionally, comparable measures should be administered over time in order to provide feedback regarding enhancement or deterioration of the behaviors originally acquired and indicate needs for additional training experience. Such measures should include post-treatment measures separated by at least one day or two in time and follow-up measures further removed in time which attempt to assess the transfer of the acquired behaviors to real life. These procedures are needed with regard to both pre- and post-treatment criterion measures.

Research on the training of complex behaviors such as those involved in personal problem solving may well demand use of a variety of criterion measures using divergent measurement approaches. This need for a more thorough and refined criterion effort is recommended on the basis of weaknesses in the criterion used in this investigation. Though the simulations which were developed for this study appear to have considerable promise for future problem-solving research, they must be elaborated to encompass additional specifiable behaviors associated with the consideration of alternative

problem solutions. One such behavior might be the rating of the desirability of each possible consequence associated with a particular alternative; and another, the estimating of the likelihood of occurrence of each outcome. Additionally, the simulations must be modified to be more parallel. Each simulation should contain a dependent variable for each behavior of interest. Such is not now the case. For example, while the Hypothetical Problem Situation contained a measure of the consideration given to possible outcomes of each alternative, no comparable measure existed in the Personal Problem Situation. Lastly, it should be noted that some parallel simulations must be developed and refined to encompass all the effective problem-solving behaviors, not just those in one skill area, in order to ascertain profiles of development in a number of problem-solving skill areas over time. The severe criticisms broached above should not however be allowed to overshadow the fact that simulations still appear to be a promising vehicle for further assessment of problem-solving behaviors.

Attempts must be made in future research designs to discriminate more clearly between effective and ineffective problem solvers in order to assess the effects of various treatment strategies. A truly inactive control group should be instituted to attain an accurate record of baseline behavior on the dependent variables. In the present study, no such baseline data was available and the discriminations between treatment effects may have been blurred as a result. Second, pre-and post-measures might be employed more extensively to provide more information regarding the specific effects of exposure to treatment strategies. Analyses of covariance could then be appropriately employed to ascertain the effects of treatments relative to the subjects' characteristics and level of performance upon entering the program.

Experimental Procedures

In future experimentation related to human problem-solving training programs, more control needs to be established in order to prevent confounding social interaction effects among students during the time treatments are administered. Also, similar controls need to be employed during the period of time which both pre- and post-treatment criterion measures are administered. The present study may well have suffered due to the length of time that was needed to complete treatment administration, and the necessity of collecting criterion data from only one student at a time. The latter procedure was necessary but consumed a period of more than a week by the time all students had been assessed. Similar procedural control needs to be imposed to insure that the initial randomization of subjects' assignments to treatment groups is maintained. Irregularities causing deviations from the random assignment procedures which of necessity were followed in this investigation (e.g., shifts in the treatment to which a student was assigned and changes in the times at which particular groups were administered the assigned treatment) likely confounded the research results. Such irregularities impose limitations upon the power and generalizability of these study's findings. The administration of most of the measures of problem-solving behaviors (especially the problem-solving simulations) should in future studies be counterbalanced as to the order of their administration and should be separated in time. This was not done in the present study. It is felt that there may have been confounding effects due to the order in which the criterion measures were administered. Some of these effects would take place within the behavior on particular subjects while other effects due to order might be spread across subjects but not in an equal or random fashion. Artifactual findings must thus result. Such effects might include subject fatigue, boredom, or elements in one or more

of the measures which serve to stimulate problem-solving behaviors among some subjects. The instigation of these improvements in experimental procedures would further remove the criterion measures from being perceived as tests or measures of performance. Some attempt should be made to specifically search out data on this possibility in future studies. No such attempt was made during the present study and it is highly likely some of the students did perceive the criterion measures as testing devices, particularly when they remember the length of time taken in criterion data collection. Lessening the probability that the criterion measures would be perceived by the subjects as measures of performance is important since measures of each subject's typical performance, rather than of their optimum behaviors that are sought. In other words, the effectiveness of the program lies in modifying what in fact the subjects do in their daily lives, not merely what they can do under favorable conditions when they know they are being asked to manifest what they have learned.

Even with improved criterion measures, it may be necessary to employ more sophisticated statistical procedures to ferret out the most important data which discriminate which discriminate effective from ineffective personal problem solvers. For example, some of the most meaningful data obtained from problem-solving simulations may be derived from the pattern of subjects' information selections. It might be postulated, for example, that a person well-trained in problem solving would select slides presenting alternative problem solutions earlier in his selection sequence than would an individual less well trained. If this is true, then statistical procedures involving pattern analysis should be recommended for further research concerning problem-solving behaviors. Additionally, the use of such techniques as analyses of covariance have been suggested previously in conjunction with the use of more pre-treatment measures.

Summary of Implications

The goal of providing each subject entering a problem-solving training program with experiences which will be optimal in assisting him or her to acquire and manifest effective behaviors when solving personal real-life problems is still far off. Further work must be done in validating the appropriateness and priority of the behaviors to be included in such a program; in developing and refining the administrative procedures, treatment strategies, and measurement devices; and in providing more complex and detailed analyses of subject treatment characteristics and criterion data. However, the net result of the investigation has been positive. Several behaviors in one problem-solving skill area have been trained with varying degrees of success, promising criterion measures have been developed, some differential effects of treatment strategies for producing particular behaviors have been uncovered, the effect of social reinforcement procedures in response to desirable verbal participation by subjects during training has been assessed, and the effect of subject sex upon the effect of various treatment approaches has been investigated.

Support for continued development of a program for training secondary school students in effective problem-solving behaviors has been gathered both from the writings of leading authorities in the guidance profession and from students in this study. Students felt they needed such training assistance and seemed to react positively to what was provided. Indeed, some control students reacted negatively when they perceived they were not receiving such assistance. Evidence indicated that future training programs should consider the use of human assistants to provide live social reinforcement during training for each particular behavior that is to be trained. Further, it appears that written booklet modeling approaches can, when appended with techniques such as social reinforcement, be quite

as effective for a large proportion of subjects as can video-tape modeling approaches in producing desired problem-solving behaviors. There are indications that semi-professional personnel, such as counselor aides, could be trained to handle the bulk of the duties associated with the implementation of a program of this kind. This would ease the economic and personnel press on schools desiring to put such a training program into operation. Particular attention must be paid in setting up training procedures to assess the subtle effect of such factors as subject sex upon the training of each behavior in the program. In the present study the influence of sex was much more pronounced when interacting with other treatment variables such as reinforcement than when studied as a main effect.

Research on the training of complex behaviors such as those involved in personal problem solving may well demand use of a variety of criteria using divergent approaches to the measurement of the phenomena under investigation. Criterion measures and the instrumentation of such measures must be refined in order to produce dependent variables which measure important problem-solving behaviors and which are instrumental in such a manner as to be sensitive to the occurrence of these behaviors. Improvements in research design will enable an increase in discrimination between effective and ineffective personal problem solvers. More vigorous experimental control will facilitate findings having greater generalizability and explanatory power.

However, monumental progress needs yet to be made before individualized training prescriptions can be made which will provide each student with the optimal amount and quality of experience he needs to achieve competence as an effective personal problem solver. Even then, the ultimate test of a personal problem-solving training program will continue to be, not research cleanliness,

nor the responses of each student in a simulation experience but rather the degree to which each student actually exhibits effective problem-solving behaviors as he daily confronts the never ending chain of personal problems which inevitably greet him in his own life.

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APPENDIX A
INSTRUCTIONS TO EXPERIMENTAL ASSISTANTS

INTRODUCTORY AND CONCLUDING REMARKS FOR PROBLEM SOLVING TREATMENT CONDITION

Introduction.

You have all indicated that you would like to learn more about things which could help you solve more effectively the problems that come up in your own personal life; like choosing a career, making new friends, and other such problems. Because knowing how to solve our personal problems is so important for everyone, and because you have expressed a need for such training, you each have been invited here today. Some materials have been prepared to help you learn how to solve problems more effectively. Please pay close attention to what goes on, and follow any further instructions that are given to you.

Conclusion.

Thank you for attending and for helping us by reacting to these problem-solving materials. We hope you have increased your problem-solving skills by being exposed to these materials. You will now be dismissed to return to your regular classes.

INSTRUCTIONS FOR ADDITIONAL PROCEDURES IN
TREATMENT CONDITIONS UTILIZING REINFORCEMENT

The presentation that is about to be given will be stopped at three pre-selected points. You have been given a booklet containing a type script of the presentation. Become familiar with the three points at which the presentation will be stopped. They are as follows:

- (1) A plus the conclusion of page 5. (Regis: So long, now.)
- (2) Conclusion of the next to final paragraph on page 6. (Roy: . . . So I'll know if its the alternative I want to choose.)
- (3) Middle of page 9. (Roy: . . . I'll talk over with him what information is needed.)

APPENDIX B

VIDEO-TAPE SCRIPT

7

Scene 1: School bell rings. Medium shot kids pouring from classrooms. Chatter and sounds but most are not distinguishable.

CUT

Scene 2: Fairly tight shot of two boys at locker. Can be pulling books and coats from lockers.

Carl: Man, I'll never get all that reading done by next Friday. I wish that teacher would take a vacation!

Roy: Yeah, me too, Carl. When I think about all I've got to do before the end of this term, I get sick. At least it won't be too long before summer gets here.

Carl: Summer! Are you kidding? School won't be out for almost three months! That's like years away!

CUT

Scene 3: Medium shot of Cindy at her locker. Pull back to show both as Toni walks up to her.

Toni: Hey, Cindy. Wait up.

Cindy: I thought you'd gone home.

Toni: No, I had to finish something in Mrs. Travers' class that had to be in today.

Cindy: Well, I guess with all that studying you won't have time for summer vacation this year.

Toni: Don't worry. Dad is talking about going on a real vacation this year. I can hardly wait for summer.

Cindy: Well, relax, it's nearly three months away.

CUT

Scene 4: Medium close-up of the boys.

Carl: Look, there's Toni and Cindy. Let's catch up with them.

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Cindy: Well, relax, it's nearly three months away.

CUT

Scene 4:

Medium close-up of the boys.

Carl: Look, there's Toni and Cindy. Let's catch up with them.

Scene 5:

Medium shot as the boys approach the girls. Group stands at the lockers and talks.

Toni: Dad says we might rent a camper and take off for for about 5 or 6 weeks. We would go to

Cindy: Toni's telling about the fabulous vacation she may get to go on this summer.

Carl: Looks like we're all dying for summer to come.

Roy: Well, this is the next to the last one we'll have to worry about.

Cindy: Why?

Roy: Next year we'll be seniors, and after that we can decide what we want to do.

Carl: Just think, after next year I'll be in vacation for 12 months or as long as I want it.

Roy. This summer is a pretty important one for me. I've got to decide what I'm gonna do. I don't want to waste 3 months.

Toni: Well, I want to get away from it all. I sure hope that Dad comes through with that vacation.

Carl: I don't have to make any decisions. I'm gonna sleep as much as I can. Wake me up in September!

(Laughter from the others)

Roy: Maybe you've got the best idea after all, Carl. I don't know - I haven't really thought about it that much yet. But I've got to start thinking about it 'cause it will take awhile to decide what I want to do. I'll see you later. I've got to go to class.

(Roy walks away, gesturing to the others.)

Others: So long, Roy. See you later.

Carl: Don't strain your brain planning this summer.

Fade to blackout - return in 3 seconds

2

Scene 1:

Roy sitting in the study hall. Medium shot slowly pulling in to a close up of Roy while thinking. Ends in medium close-up of Roy's head.

Roy: (While reading text book, thinks) I wonder if Carl really has the answer about this summer. Why should I even think about it? Except that the summer vacation's almost three months of time. That's a big chunk of time. There are so many things that I could do. And it's the last summer before I finish high school. Maybe I could use this summer to help me get ideas about what I'm going to do after graduation. And it sure would great to have a little extra money next year. Well, I guess I'd better face it; if I want to get the most out of this summer I'll need to use the best ways I know of solving the problem. (Taking up pencil and paper) I'll make an effort to solve this problem the right way. (Writes while thinking) Problem: What to do during summer vacation? (Thinks) There are a lot of things I could do. I'll list some and find out information about them. (Writes on his page) Alternatives Maybe if I consider several alternative solutions to this problem before I decide, I'll be happier with what I choose.

Class bell rings. Pull back from close-up to medium shot. Other students can be seen gathering their books and leaving the study hall.

Roy: (Thinking) Let's see. I could do what Carl's going to do. Just sleep in every morning, relax and play around as much as possible. I've done that during some other summers. (Writes and speaks) Relax and fool around at home. I wonder how many things there are to do this summer.

Roy gathers his books and leaves.
FADE OUT - FADE IN

3

Scene 1:

Roy entering Guidance Counselor's office. Medium shot.
Mr. Regis and Roy exchange greetings and sit down.

4

Scene 1:

In the counselor's office.

Roy: Mr. Regis, I've got a problem and thought you might be able to help me. This summer is coming up and I really want to use it the best way I can. I figured that if I found out about as many things as possible to do during the summer before I decide, I'd be happier with my choice than if I just did the first thing that comes along.

Mr. Regis: That's a good idea, Roy. I think you're right. It's a good approach to problem solving. There are some other good reasons for considering several alternatives when you solve a problem too. When you consider alternatives, it helps you to define the problem clearly. Let's take your problem for instance. If you were going to consider only one or two alternatives, you would probably have defined your problem as "should I get a job or play around" or perhaps "how can I find a job this summer." But because you're attempting to consider many alternatives, you've defined your problem much more clearly, that is, "how can I best use my time this summer," and you've set some goals that you want the solution you choose to fulfill.

Roy: (shot over Roy's shoulder. Roy writes underlined words.)
I have some goals but I really haven't written them down or anything. Now that you say that setting goals

is so important, I think I'll write them down.

(Writes on first page of tablet as he speaks) I want to make some money this summer. It'll come in handy during the next school year and I can save some too.

Another thing is that I'd like to meet people. I enjoy talking to people and I'd like to develop some skills that might help me get a good job later too.

But I want some time to just goof around too. (writes recreation time on tablet)

Mr. Regis: Good! Considering several alternatives also effects how you look for information to help you solve your problems and effects how you use that information. The more alternatives you have, the better off you'll be. There's one possible problem there which you should look out for. Some people spend all their time considering alternatives and never making a decision. Or they find that it's too late to make a decision.

Roy: You mean like thinking so long about which girl you want to invite to the movies. When you finally decide on which one, she's got a date! (Both laugh.)

Mr. Regis: That's right! You can't spend an unlimited amount of time on any problem. They demand solutions. So set up some reasonable time limits for yourself and look into several alternatives. Then you will be able to pick one out. Just don't wait until the summer vacation is here to decide. I'll try to give you all the information I have that might help you.

Roy: There's already one alternative in my mind to think about. I've heard alot about summer school and I

want to find out about what courses are available.

You know, what it costs and things like that.

Mr. Regis: The catalogue which should have all the information you're looking for will be out next week. Some courses go for five weeks, others for ten weeks, so you could go either the whole summer or just half the summer. Stop in next week and pick up a program of courses to see if there are any you are interested in. You have another six weeks before you have to decide whether or not to sign up anyway.

Roy: I'm not sure I want to go but it's an alternative I want to consider. (writes on paper) #2 Summer school
Thanks for your help, Mr. Regis. I'll check back with you once in awhile to see if you have any more information about alternatives.

Roy gets up to leave the office. They say goodbyes, etc.
Leaves office.

CUT

5
Scene 1

In the hallway outside of Mr. Regis' office, Roy bumps into
Toni Medium shot

Roy: Hi Toni.

Toni: Hey, you've been to see Mr. Regis. What's up?

Roy: Well, I've decided to solve this problem of how to spend my summer vacation in a better way than I normally use in figuring out my problems. Mr. Regis is giving me some help in considering several alternatives before deciding what I actually am going to do.

Toni : And he really did help you?

Roy: You bet. He's been giving me the strategy for solving

all kinds of problems. I guess his main point was to consider several different solutions to a problem and then decide which is best. I will need alot more information on each one, before I can pick one, but my list is growing. And he told me something that I'll have to be careful about in solving a problem.

Toni : What's that?

Roy: Spending all my time looking for alternatives and waiting too long before making a decision.

Toni: Well, lots of luck. I've got to run. I hope I've got my summer problem solved by taking a nice vacation. See you later!

Roy: OK! And thanks, you've given me another idea! See you tomorrow.

CUT

5 A
Scene 1

Roy turns and walks down the hall while thinking. Medium shot to long shot.

Roy: A lot of people take vacations during the summer. there are all sorts of places to go. Of course, there are plenty of disadvantages besides the good things about it. For instance, it costs money. But it's another alternative, and I can study about it some more so I'll know if it's the alternative I want to choose.

FADE OUT. FADE IN

6
Scene 1

Long shot of students in hallway. Bell rings and they enter classrooms

Classroom scene. Teacher reading a special bulletin. Students working at desks. Boy enters and hands the teacher a piece of paper. Long shot pulling in on teacher when she talks.

Teacher: Can I have your attention for a few minutes. There are a few messages and announcements that I have to read to you. Anyone interested in trying out for the wrestling team are asked to meet in Room 124 at 3:00 on Thursday. Coach Anderson ask that you be on time.

The YMCA is asking for volunteers to act as camp counselors this summer at Camp Laguna. You must be at least 16, a good swimmer and have some camping experience. For more information, contact Mr. Daily at the local YMCA.....

The teacher's voice continues but the level fades down and Roy's voice (as a thought) comes up. The camera moves in on Roy.

Roy: Hey, that's another idea! (Takes out paper and pencil and writes) #4 Volunteer Work - at the YMCA as a camp counselor! There must be dozens of different opportunities like that during the summer. There are all sorts of organizations giving service or help to other people. I wonder how many of them are looking for help this summer. (The bell rings. Camera pulls back to show students leaving the classroom. Roy starts to get up to leave. He is still thinking) I'd get a chance to meet alot of new people and it would be sort of like having a job. Of course, I wouldn't make much money. But I would be helping other people and that's groovy. (Roy walks up to Mrs. Blair, the teacher) Mrs. Blair,

who was that you said we should contact if we're interested in the YMCA thing?

FADE OUT-FADE IN

7
Scene 1:

In Roy's house. He enters the living room and greets his father. Long shot pulling in on Roy and his father when seated.

Roy: Hi Dad, how's it going?

Father: Pretty fair, Roy! How was your day?

Roy: OK, I guess. I've been trying to figure out what I should do this summer.

Father: So far ahead?

Roy: Well, it's less than three months away and it takes time to find out what things I might do. I'm trying to do a good job of problem solving if I can.

Father: Sounds good. Can I help?

Roy: Since I'm trying to consider several alternatives or possible solutions to my problem, well, maybe you have some more ideas for me. I've got to find out alot more about each of the alternatives I have on my list. So far, I have four listed. First, I could spend my summer just relaxing and foolin' around. That's what Carl says he is going to do. Second, I could go to summer school. I could either improve a grade in a course I have taken or advance in my subjects for my senior year. Maybe then I won't have to take a full load. Another alternative is that I could do volunteer work, Mrs. Blair read a bulletin from the YMCA about their needing counselors this summer and I can think of plenty of other groups around town who can use volunteer workers. Toni gave me my fourth alternative.

She said that her family is going on a long vacation so I listed Travel as my fourth alternative.

Father: Well, you've really been working at this problem. If I'm not mistaken, I've heard you talking to your mother about getting some kind of training or education after high school, haven't you?

Roy: I haven't really decided yet. Maybe I'll get some vocational training this summer. I'm sure that I need more training or at least more specialized training in order to get a good job after high school. That's assuming I decide not to go to college. Maybe I could get a full time job this summer and see how it goes.

Father: That's a good possibility. Besides learning what it's like to have a full time job, you can make some money to use next year or save for getting more education or training after high school. Check with your counselor and with the local state employment office. Maybe you can have a job lined up before school gets out. I can check around for you and see if anyone I know might have some summer jobs.

Roy: Gee Dad, that's great. I'll watch the newspaper ads and go downtown to the large stores. They may have some openings.

Father: Here's another idea. Why don't you see about getting some vocational training this summer. There are several private training schools in the area that give courses in many different job skills and occupations.

I'm sure your counselor can tell you what they are. You could start preparing for a good job after high school right now.

Roy: OK. I'll check with Mr. Regis tomorrow on it. You know, I might be able to do a couple of these things rather than just one.

Father: I'd put that combination idea as another alternative.

Roy: I'd better go write some of these things down before I forget them. That list is really growing.

Father: Slow down, old man. You know this list can become too long. Maybe you had better limit yourself to some reasonable time limit. Select the alternative you want after you have found out all the pertinent information.

Roy: Hey Dad, that's just what Mr. Regis said. The point is slowly sinking in. I have to be able to choose one of these alternatives - not just keep an ever growing list. Most of them look pretty good. There isn't one I wouldn't mind doing. Well, I have an appointment with Mr. Regis in a couple of days and I'll talk over with him what information is needed.

FADE OUT-FADE IN ON NEXT SCENE

8

Scene 1:

Two days later in Mr. Regis' office.

FADE IN AUDIO . Medium shot of Roy and Mr. Regis talking

Mr. Regis: From what you've told me so far Roy, you're gathering some excellent alternatives for this summer. But we need to discuss what you do with these alternatives.

Roy : That's a good idea. What do you do when you consider alternatives?

Mr. Regis: There are really three things to do and you've worked on two of them already. You've thought about the things that might happen if you pick a particular alternative; in other words, possible outcomes. You have your notebook with you, don't you? Turn to one of the alternatives and I'll show you what I mean. Read what you have there.

Shot over Roy's shoulder.

Roy: Well, one of my alternatives is to get a full-time job this summer. Then I've got a heading called possible results.

Mr. Regis: That's what I mean. You've figured out what good things and what unpleasant things might happen if you pick that alternative. Go on.

Roy: First, I have Possible Good Results. (1) making a good amount of money, (2) learning what it's like to have a job, (3) possibly develop skills that would help me in later jobs. Then I have, Possible Bad Results. These are (1) not much time to myself to do whatever I want and (2) may have to take a job I don't

like

Mr. Regis: Well, we could probably think of more possible outcomes and maybe you'll want to do that later, but that's very good. As you get several alternative solutions to a problem, you consider each one first by discovering what the possible outcomes for each alternative are and this you have already done. If you decide to work full time this summer, some of the results might be good, and others not good. Next, you decide how much you want each of these outcomes to happen. You've done that already, too, by saying that some are good outcomes and others bad. Now, some people like to go into more detail on that and maybe rate each outcome as to just how desirable it is, but that's up to you. The important thing to remember is to find out what the possible results are that might come from selecting each alternative, and estimate how desirable or undesirable each of these outcomes are to you. Then find out how likely each of these good and bad outcomes is. I mean, what's the chance each will happen. For instance, the chance that you'll make some money if you decide to work full time is pretty high, and the possibility of developing job skills which will help you in later jobs isn't so high. (Regis and Roy discuss estimating probability of outcome). So when you consider each alternative, figure out the possible good and bad results, decide how likely each one is to happen and how desirable or undesirable each outcome is, and then match

that alternative up with your goals to see how it fits them.

Roy: That's a lot to remember, but I think I've got it.

I'll check back from time to time to let you know how things are going.

9

Scene 1:

Show time lapse (calendar number). Two weeks before the end of school. Cindy, Toni, Roy and Carl are eating in the cafeteria.

Carl: Well, if we could have won that game last Friday, it would have put us in the playoffs. Now I guess it's wait until next year. At least football comes right away next fall.

Roy: With most of our starting team back, we could take the league title.

Carl: Only if nobody's looking. We looked pretty bad in practice this week.

Cindy: Say, Roy, whatever happened to that project of yours. You were having these talks with Mr. Regis on how to solve problems.

Roy: Oh, I haven't forgotten. As a matter of fact, I'm all set up for this summer. I got word a couple of weeks ago that I was accepted to work at Bowman's department store four days a week all summer and on Fridays and Saturdays I'm going to be a weekend counselor at one of the YMCA camps up by Madera Lake.

Carl: Hey, that sounds like fun. You'll make money at your job and get a chance to relax and play around.

Roy: The camp job will be work too Carl, but it's a change of pace and more relaxed all right.

Toni: Well, while you're working, I'm going to be having fun

and seeing new places. Travel--that's the life for me. We may see half of the states in the country. Of course, Dad isn't quite sure about the trip yet, but I'm sure it's just a couple of details to be worked out. We're sure to go.

Carl: How about someone coming along to help eat the food?

Toni: Roy, how did you decide what you were going to do this summer?

Roy: Well, it took some work, but it was worth it. First, I tried to say just exactly what my problem was and decided exactly what I wanted to get out of the summer. Like for instance, I wanted to have a solution to the problem that would get me some money this summer, but I didn't want to be tied down all the time. Then I tried to consider several alternatives before I made a decision. I got ideas from a lot of people including some of you. One of my alternatives was to travel, so I got all sorts of information on travel, where to go, what to see, how much it cost, etc. Another alternative was to get a summer job, so I found out about a lot of different jobs; what you make, what you do, the hours and working conditions.

Toni: Where did Mr. Regis fit into all this?

Roy: He helped understand what you do when you consider alternatives. First, I figured out the possible results of picking each alternative, the good and bad things that might happen. Then, I estimated just how likely each possible result was--you know, what's

the chance that each one of them might happen? There's no use picking an alternative if the good results you think are going to happen don't have much of a chance of happening. Then I was ready to select an alternative and put it into action. I looked at each alternative in terms of all I had learned about it and how it fit my goals.

Carl: Maybe I ought to do something like that. I've just been thinking about how great it will be to get out of school for three months and relax and do nothin'. But it sounds like you're really going to have some good things going this summer.

(Bell rings).

Toni: Gee, I wonder what things there are that I could do. I wonder what's best for me.

Roy: Well, there's one good way to find out. The process of considering several alternatives worked well for me. I'll help you if you want me to.

Carl: Right now it's time to get to class.

(They start to get up.) Scene FADES.

It's the first day at school and this scene is in the school building near the lockers. It starts as a long shot but zooms in on Roy and Carl talking by their lockers.

Roy: Hi, Carl, got all your books yet?

Carl: Just about. There's this huge line in the library where the Social Studies books are being handed out. I guess I'll wait on that one. You know, in a funny way, it feels good to be back here. It know that sounds weird but it's better than doing nothing.

Roy: What do you mean "nothing"? I thought you were going to have a great time. You said you were going to look for things to do this summer. What happened?

Carl: I was but I guess I waited too long to get started. I started to do like you said: to look into alternatives but the jobs were taken before I got there and - well, I just started too late. Another failure by the Great Carl. I seem to go about solving my problems the wrong way. I can think of lots of things I want to figure out where your way could be very useful. Like whether or not I should go to college - the Senior Worry.

Roy and Carl walk down the hall towards the library. They continue talking. Medium long shot.

Roy: Well, did you do what you were planning to do before? Some glorious goofing around and relaxin'

Carl: Sure, that was fine for a month or so - sleeping in every morning, doing nothing. But pretty soon it got to be a drag.

Roy and Carl enter the library and stand on a line waiting for books. Medium shot. Carl continues talking.

Carl: But it got to be pretty much of a drag. Everyone else was doing something interesting, making money or something else. So here I am, with the summer gone and nothing to show for it.

(The line is moving very slowly.)

Roy: Well, maybe next summer can be different for you.

(They reach the counter and are handed their books. They leave the library and talk in the hall.)

Carl: One thing is sure. I'm going to start earlier.

Maybe if I'd consider alternatives, I could have seen way ahead that I was headed for a lousy summer. I'd like to try solving my problems in the way Mr. Regis showed to you. Even if I decided to goof around part of the time, I would have something else to do. When you come over tomorrow, let's spend some time talking about it. You know, exactly how it was all figured out and that stuff.

Roy: Sure. I'll be happy to tell you what I learned. There's Toni and Cindy over there. I want to find out how their summers went. See you later, Carl.

[Camera trucks along with Roy walking over to the girls.]

Roy approaches Toni and Cindy in the hallway.

Roy: Hi, Cindy, Toni. How was your summer?

Toni: Don't even mention it. Let's forget the subject.

Roy: What's going on? I thought you were going to come back and tell us about the rest of the world. Wasn't it fun?

Cindy: She didn't go, Roy.

Roy: What? I thought it was a sure thing. What happened?

Toni: Oh, something came up at Dad's job so he only got one week's vacation. The rest of the time I just had to find things to do on my own. It was miserable what with all the little brothers I have and their monster friends. Mom stuck me with babysitting 'cause I was always free.

Roy: Well, I suppose one week was better than nothing. So the summer was bad.

Toni: The worst. But I guess it was partly my fault.

Cindy: Why?

Toni: Well, I was so sure about the trip. I never really listened to you when you explained how you solved your summer problem, Roy.

(They slowly walk down the hall towards the school entrance.)

Toni: I could still have picked travel as my first choice but if I had followed your ideas about considering several alternatives, I'd have been all set to do something else if my first choice didn't work out. The first time I heard about the possibility of our going on a long vacation, I just stopped thinking about anything else to do during the summer. That's what you (looking at Roy) would call "not considering alternatives". I just considered one. So when that roof fell in, I didn't have anything else left. At least I'll know better next time. That's the last time I'll do that. The old saying of putting all the eggs in one basket. Ugh. I'm convinced Roy. I'll try your way next time.

Roy: Well, I did have a second alternative in case my first

didn't work out. Doing that was simple because I had information on all the possible alternatives. I can see now that it was a good idea Mr. Regis suggested. How about you Cindy? How did things go for you?

Cindy: OK I guess. But I sort of drifted also. When you talked about how you were solving your problem, I started to find out about some alternatives for things to do during the summer and got all confused. It was fun finding out about things, but I did start awfully late and I never got around to deciding anything. So, I just sort of drifted through the summer. I'm beginning to think that I would have had a much better summer if I had used your strategy.

Roy: That sounds like what Mr. Regis warned me about happened to you. He said there was a real danger of spending too much time looking into alternatives.

Cindy: Enough about my hard luck story. I read some groovy books...You haven't told us about what you actually did this summer.

Toni: Come on, cheer us up. Let one of our group have had a decent summer. Or did your summer plans go haywire too?

Roy: I feel like I'm rubbing it in after what happened to you. But my summer was great! I had a job at Bowman's for 4 days a week and did the YMCA counseling on the weekends. Some funny things happened at that job at Bowman's like the time.....

FADE OUT - PAUSE- FADE IN

APPENDIX C

ORAL LECTURE SCRIPT

Everyone here today is a problem solver. You've already solved thousands of problems during your lifetime. Even things which you now don't consider to be problems at all were once very difficult problems for you to solve. For example, tying your shoelace. I don't imagine there's anyone here today who can't do a pretty fair job of tying his shoelace. Can any of you remember when you could not tie your shoelace? At one point in your life, doing this very simple things was very difficult. Your mother or father may have helped you practice, or had you start by just doing part of the knot and then had you do more of the task yourself. Gradually in time and with a lot of effort you became able to tie your own shoelaces. With some help, you solved what seemed to you, at the time, a big problem.

In a way things haven't changed very much. You are still attempting to solve difficult problems but the types of problems you solve have changed. Each of you think for a moment of some problem that you have in your life right now. It may be: whom to date? where to go on Saturday? what courses to take next year? what career to go into? or any one of a thousand other decisions. Knowing how to go about solving these and other problems that you come up against is tremendously important. It affects your whole life from the time you're born until your death. The way you solve your problems affects the lives of other people. Numerous authorities believe that many of the people who are having the most trouble in our society just don't know how to solve problems. For example, perhaps the person who steals faces a problem of needing money and steals because he doesn't know any other way to solve his problem. He makes a bad choice; he decides to steal. Many adults who get divorced may not have the skills needed to solve personal problems that develop in their marriage and therefore wind up getting a divorce. Some psychologists tell us that many of the people whom they help need to learn how to solve problems that occur in their lives. Perhaps

there are those of us who could certainly solve our problems more effectively than we do, if we just knew how to do it.

As life gets more complicated, there are more and more problems for each of you to solve, and the problems get more difficult. Such problems as whether or not to go to college wouldn't have faced most of us if we had lived 100 years ago. As another example, take the problem of deciding on a career. During the last century, there were relatively few jobs that existed and most of us would have simply done what our fathers did for a living. But now, there are more than 40,000 different kinds of jobs in the United States and a student rarely follows the same job as his father. There are many other examples that could be used to prove the point. You will continue to face more difficult problems as life gets more complex and as you grow older.

But how can you learn to solve problems effectively? I am going to talk about several things to do and then talk more about one of the most important of those things. First, whenever you have a decision to make or have a problem to solve, you need first of all to define clearly what that problem is. For instance, suppose there is a school dance and a good movie on the same night. Rather than just say that your problem is "What should I do?" or "Should I go to the movie or the dance?", you should be more clear and say that your problem is, "How should I spend my time Friday night?" Also, when we define what the problem is, we should give any conditions which have to be met by a solution we choose to solve the problem. For instance, if we want to make sure we spend the least money possible, and that's the most important thing to us, we should include that in our definition of the problem. You want to decide what to do Friday night that will cost you the least amount of money, while still allowing you to leave the house and have a good time. So now you know what the problem is and could tell someone else exactly what it is.

Another important thing to do in solving problems of all kinds is to get information on various opportunities. If you are trying to decide on what courses

to take next year, you need to get accurate information about what courses there are, what you do in each of them, which ones you need to graduate, what your interests and abilities are, and a lot of other information which could help you. In our problem about what to do Friday night, we would need information on the dance, the movie, and on other things that are available to do. There are many other things involved in getting helpful information of course. We must know where to go to find the information we want. This is called the source of information. And once we find a good source, we have to know how to use that source. If we want information from a dictionary, for example, which is one source of information, we must know how to use a dictionary.

There are many other things that could be mentioned which would help in solving problems more effectively, such as being more aware of when a problem actually exists, how to select an alternative solution to the problem, how to implement the solution you choose, and how to examine your problem solving behavior in order to improve it.

Today we want to spend most of our time talking about one of the most important parts of the problem-solving process. The things you learn will be of help to you in solving the problems that you meet throughout your life. This aspect of problem-solving is the consideration of several alternative solutions to the problem before making a decision about how best to solve the problem. What does that mean? Making a decision is the part of the problem-solving process in which you choose the course of action you are going to take in solving the problem. Considering several alternatives before making a decision means that you should think about and study different ways to solve the problem before you choose the one way you think best. Let's assume your problem is how to get from here to San Francisco. Before you just start walking down the street toward San Francisco, it would be better to consider other ways of solving the problem, such as going by train, plane, car, boat and possibly other ways. It sounds very simple in this example but many of us often forget to do this when

we work with problems in our own lives. Often, we try to solve the problem in the way that looks like the easiest, or try the first thing that comes into our mind.

Why is it important to consider several alternatives and how does it affect the rest of the problem-solving process? Considering several alternatives before deciding on a solution to your problem will affect most of the things you do throughout the whole problem-solving process. First, how might considering several alternatives affect how you define the problem? Let's return to the earlier example of the dance and movie on the same night. If you didn't try to consider several alternatives you would probably define your problem as, "Should I go to the dance or the movie on Friday night?" If however, you keep in mind that you want to consider many alternative solutions to the problem before you make a decision on which solution is best, you would probably define the problem as, "How shall I use my time Friday evening?" This will let you think of many more ways to solve the problem than just going to the dance or movies. You could also consider having a party, playing table tennis, or perhaps reading a book.

A second way that considering several alternatives can affect the way you solve the problem is that it will let you get more information before you decide. You will also be more open to information on the problem from many different sources. Psychologists have learned that when people only consider one alternative as they solve a problem, that they tend to avoid or not pay attention to information about other ways to solve the problem. They have made a decision too early in the problem solving process and don't want information which might show that they made a bad choice. Considering many alternatives will let you get a much wider variety of information. Looking for information in this way gives you ideas for even more alternative solutions to the problem.

Another good effect of considering several alternatives is that you will be more likely to pick an alternative that will work well. If you pick one alternative from five different ones you've studied, the chances that it will work are greater

than if you only consider one and choose that one by default. In other words you'll probably have a better chance of successfully solving the problem.

If you consider one alternative only, and it fails, research tells us that you probably won't be able to learn what you did wrong. That is, you may go on making the same kind of mistakes when you try to solve problems in the future. If you consider only one alternative and it doesn't work out, it will be much harder for you to admit that it didn't work and more difficult for you to learn from what you did wrong in order to solve a problem better in the future. Considering only one alternative seems to lessen a person's ability to objectively look at what he did and see his mistakes. In contrast it would be easier to analyze the problem-solving process you've gone through and learn more from it if you've considered several alternatives as you solve the problem.

The last major effect of considering several alternatives before deciding is that you will probably select a second alternative from those you considered, to use if the first way to solve the problem doesn't work. Putting it another way, if you plan on one alternative right away and never consider any other ways to solve the problem, you won't know what to do if the one alternative doesn't work out. However, if many alternatives are considered, and something comes up that prevents you from carrying out that solution, or if you can see that the way you picked isn't working, then you have a second way to solve the problem to which you can shift. Let's look at an example of this happening.

Vince decided he wanted some kind of education after high school. His best friend was planning on going away to State University, so Vince just figured he'd go there too. In fact, he didn't even investigate any other possibilities. When he received a letter saying that the university had already accepted as many new students as it could, Vince found it was too late to apply anywhere else. He had lost at least a year in getting started because he had no "backup" plan to use when his first choice of a solution to his problem didn't work out. In contrast, Vince's friend Ted had investigated four or five different schools and while he

received the same letter Vince did from State University, two of the other colleges to which Ted applied accepted him and he already had decided what he would do if State University did not accept him.

We've talked about some of the effects that considering several alternative solutions has on the whole problem-solving process. But you might still ask, how do I actually do it? Show me how to consider several alternatives. First, where do you get alternative solutions to the problem?

One thing that will help you is to ask other people for ideas. They may have had similar problems themselves or know of people that have. Perhaps they can provide you with suggestions as to different ways to solve the problem you face.

Another way to find alternatives is to look closely for them in the information you collect about your problem. Let's say you have the problem of picking out a new article of clothing. Specifically your problem is to pick out a blue sweater and stay within the amount of money you have set aside for it. Upon finding a sweater that meets your qualifications, the sales person tells you the store is out of your size. Some people might automatically think to themselves that they will have to either go to another store or not buy the article of clothing at all. However, if you are looking for alternatives to consider, this piece of information should give you at least these new alternatives.

1. See if the store has other branches and if they do, maybe they have your size or something you'd like better.
2. Find out if they will be getting more stock of that item or maybe something even better and wait to buy your new clothes.
3. Investigate how the article of clothing is cut. It may be that you can wear a size you don't normally wear.

Another good way to find alternatives is to combine one or more of them. For instance, rather than deciding to go to a party or the movie, maybe you can do both. Rather than either getting a summer job or going to summer school,

perhaps the individual would take one summer school course and work the rest of the time, or take night classes and work full time during the day. We've mentioned several ways of finding alternatives. There are many other ways including brainstorming and other techniques.

But even if you find several alternatives, what is meant when we say you should "consider" each one? In urging you to solve problems in this manner you need to know just what you do when you "consider" an alternative.

There are several things that you do when considering an alternative. One is to find out what must be done to take advantage of that alternative. If you are trying to solve the problem of how to meet new people, one alternative would be to place yourself in situations where you don't know anyone. To carry out this alternative you have to find situations in which you don't know anyone, and you must put forth the effort to place yourself in these situations. Another alternative would be to go with someone you know to places or events where there are many people you do not know and have your friend introduce you to some new friends. This would involve contacting a friend and getting him or her to help, going to the event or places you decided upon, and actually being introduced to others. You might also want to find out what you should wear, about any costs in going to these events, and other items of information.

Another thing that needs to be done when an alternative is considered is to find out the possible consequences of choosing the alternative. Let's stick with the problem of wanting to meet new people. First, let's list a few of the alternatives that someone might uncover in trying to solve this problem.

1. Purposely go by yourself to places or events where you know no one.
2. Ask the help of a friend in going with you to most places and introduce you to all the people he or she knows.
3. Practice various things to say when introducing yourself to someone new.

These could be practiced with some friends you know well.

4. Join some organized social group where perhaps there will be others who would like to meet new friends.
5. Find other people who would like to work on the same problem and hold a discussion with them.

Five possible alternatives for solving the problem have been listed. What possible consequences might occur as a result of choosing each of these alternatives?

Take the first alternative for example. Alternative #1--Purposely go by yourself to places or events where you know no one.

One possible consequence that might occur is that you will be completely ignored. Perhaps no one will come up and talk to you at all. Another possible consequence is that you will have to go many, many times to several new places before you will be successful in meeting new people. But all the possible consequences are not negative or undesirable.

Possible positive consequences that could result from choosing this alternative include finding many new friends at the first place you visit or finding a new interest or hobby through attending the places or events you choose. That is, although you went originally for the purpose of meeting new people, something else that's pleasant may occur that wasn't included in your original purpose for going.

Similarly, in considering several alternatives, each of the other possible alternatives should be studied closely to discover all the possible outcomes from each. There are several possible outcomes, both positive and negative, from each of the alternative solutions we have talked about.

Once each alternative has been studied for possible outcomes, these outcomes or consequences must be judged as to their probability of occurrence and their desirability. How and why do you do this? In looking over the possible consequences of a particular alternative, some of them have almost no chance of happening; others may have a 50/50 chance of occurrence, and some may be almost

certain to happen. Suppose you decided to not select alternative #1 as the solution to the problem because one of the possible consequences might be that absolutely no one would talk to you at the event you choose to go to. Discarding alternative #1 for that reason is rather unwise since that particular outcome has a small chance of happening. If you can assess in some way the chance that each of the possible outcomes might happen, you can be sure that each possible outcome has the right amount of influence in your decision as to which of the solutions to the problem you should choose to try. If an outcome has a high chance of happening, you would probably give it a little more influence in your decision than if it has practically no chance of happening.

There are really two ways to find out what the chance is that a possible outcome will happen. One is to just estimate it yourself. This is a personal estimate of how likely that outcome is.

For example, let's say that in thinking about how likely it is that no one at all will talk to you when you attend an event alone, from all you know and from your past experience you decide that there is only a 20% chance that such a thing could happen. You'd say that 80% of the time at least someone at the event would talk to you. 20% is your personal estimate of how probable it is that no one at all will talk to you. Or you can just say that it is quite unlikely to happen. Whether your estimate is in percentages or words doesn't really matter, just so you have an idea as to how likely a particular outcome is.

Another way to get an idea about how likely a particular outcome is to happen is called objective probability. There may be information for example on the experience of other people who did the same thing. If someone shows you a table showing that when people like you did what you plan to do, 30% of the time no one spoke to them. You have an objective probability estimate that there is a 30% chance that no one will speak to you when you attend the event. Both of these methods help you decide how likely it is that a particular consequence of an alternative might occur, thus assisting you in deciding just how you choose to

solve the problem.

A second major consideration with regard to studying possible consequences of alternatives is the desirability of each outcome happening. It may be enough to just label each of the possible outcomes as positive or negative as we have. Those labeled as positive, you would like to see happen; and those labeled negative you do not want to see happen. Whether a possible outcome is desirable or undesirable has a big influence on your choice of a possible solution. Some outcomes might be so undesirable that you would discard an alternative solution in order to avoid the possibility of those outcomes occurring. On the other hand, some might be so desirable that you would choose that alternative with the hope that they would occur. The main factor that helps you decide on the degree to which a particular outcome is desirable or undesirable is your own personal values. There may be general values such as religion or security that are important to you, or the values may be specific to the problem you're trying to solve. For instance, for one person the thing that's most important in solving the problem of how to meet new friends is such as wanting to meet a certain kind of person as a new friend, For another person solving the same problem getting the problem solved within a certain amount of time is the most important thing. One you know what things you want to get in a solution to the problem and what things are important to you generally, you can estimate how desirable or undesirable a particular outcome is. Some people try to rate each outcome along a scale of desirability with such categories as very desirable, slightly desirable, slightly undesirable, very undesirable. Others choose to rank all the possible outcomes from a particular alternative with the most desirable one at the top and the most undesirable at the bottom of the list. Exactly how you do this doesn't matter. The important thing is to know how desirable or undesirable for you, each possible outcome is.

Let's review the things you should do when you consider several alternative solutions to problems. You investigate several possible solutions to the problem, which you gathered from several sources. You determine in general what you would need to do to implement each of these alternatives. Further, you study each alternative solution to the problem in relation to the possible consequences or results that might occur if you choose that alternative, as well as how probable and how desirable the occurrence of each possible outcome is. Now each alternative with the information about it and its consequences is studied in relation to the rest of the information you have about the problem. Keeping in mind the nature of the problem, what things you want to achieve in a solution, and other problem information you gather, you are ready to start the process of actually selecting an alternative solution to be implemented.

All the things we have discussed are involved in the aspect of problem-solving known as the consideration of multiple alternative solutions to the problem.

This discussion has been presented because all of us are called upon to solve many problems that come up in our life, such as selecting courses to take in school, whether or not to go to college, how to make friends, what career to choose and other problems. Considering several alternatives to the problem is an important skill which will help us all to solve problems more effectively. We have talked about why it is important, and just how a person does it. Try to put the things you've learned today into action as you try to solve problems you face in your life right now and as new problems come up.

Jerry's Problem

Directions:

You are being asked to assist a high school student named Jerry in solving a problem he faces in his personal life. Information which can help you do this has been placed on a series of slides. One or more of these slides has been placed in each of the red envelopes on the table. Attached to this paper is a program describing which slides are contained in each envelope and the information on each slide that is available to you. The assistant will show you exactly how to operate the slide projector. You may look at as many slides as you wish and you may look at them in any order and for as long as you wish. At the end of 10 minutes you will be asked to write down on the bottom of this paper which of the possible available solutions you think Jerry should choose, in order to solve his problem wisely.

You must remain in the room for the entire 10 minutes. You may use as much of the 10 minutes as you wish to help Jerry make his decision. As you can see, there are other available activities in the room if you choose to use a portion of the 10 minutes on something other than helping Jerry solve his problem. When you finish with an envelope, please put the slides back that belong in it so that others may use the materials.

Now please give your attention to the assistant who will help you learn how to use the projector.

TO BE COMPLETED AT THE END OF 10 MINUTES

I think Jerry should choose solution A B C D E F ...
(circle the solution you think is best for Jerry)

Thank you for helping Jerry solve his problem.

SLIDE PROGRAM

Envelope #1 This is Jerry's problem and his goals for solving it.

Slide #1. Explains what Jerry's problem is.

Slide #2. Jerry's goals in solving the problem.

Envelope #2 Information about Jerry.

Slide #3. About Jerry's past life.

Slide #4. Jerry's interests.

Slide #5. Jerry's abilities.

Slide #6. Things in life that are important to Jerry.

Slide #7. Jerry's goals for the future.

Envelope #3. These are the school activities available to Jerry.

Slide #8. Some school clubs.

Slide #9. Special interest groups.

Slide #10. Musical organizations.

Slide #11. Student government.

Slide #12. Varsity sports.

Slide #13. Intra-mural sports.

Slide #14. Work study program.

Envelope #4. Possible Solution

Slide #15 Solution A
#21 possible good outcomes
#22 possible bad outcomes

Envelope #5. Possible Solution

Slide #16 Solution B
#23 possible good outcomes
#24 possible bad outcomes

Envelope #6. Possible Solution

Slide #17 Solution C
#25 possible good outcomes
#26 possible bad outcomes

Envelope #7. Possible Solution

Slide #18 Solution D
#27 possible good outcomes
#28 possible bad outcomes

Envelope #8 Possible Solution

Slide #19 Solution E
#29 possible good outcomes
#30 possible bad outcomes

Envelope #9 Possible Solution

Slide #20 Solution F
#31 possible good outcomes
#32 possible bad outcomes

APPENDIX E

CAPTIONS OF SLIDES USED IN HYPOTHETICAL PROBLEM-SOLVING SIMULATION

This is Jerry's problem.

Slide #1. This is Jerry. Next month when school opens he will be a senior in high school. The problem he must solve is this: what school activities should he take part in during his senior year?

These are the requirements Jerry's problem solution must meet.

Slide #2. Jerry wants a solution to his problem which will meet all of these requirements if possible. a) He wants to meet new people. b) He wants to get some regular physical exercise. c) He wants the activities to cost very little money. d) He wants the activities to allow him time for his hobby on Saturdays.

Information about Jerry

Slide #3. Personal History: Jerry grew up in a town close to a large city. He has a brother and a sister. His father has a good job and his mother is a housewife. He has lived in two different towns. He played baseball in Little League and has a couple of awards for his musical ability.

Slide #4. Interests: Music and building models have been Jerry's two main hobbies, but he is interested in outdoor activities such as camping and sports. He received a school letter in one sport in high school and enjoys performing in assemblies. Clerical tasks, math assignments and science experiments aren't too interesting to him. He enjoys talking with people and being in group activities.

Slide #5. Abilities: Tests and grades show that Jerry performs best in music and physical education classes. His next best work is in speech and social studies courses. He does average work in English and shop. In science

and math he doesn't perform as well. He is skilled at getting along with and talking to people.

Slide #6. Values: Jerry thinks being liked by other people is very important. He works hard in most of his classes because he feels it's good to see how much he can learn about a lot of different subjects. He is active in his church and feels that family, friends, and education, experiencing many different things in life are most important.

Slide #7. Life goals: Eventually, Jerry looks forward to getting married and settling down. Before then, however, he wants to do some traveling, develop his musical and athletic abilities and also wants training after high school for a steady job.

These are the school activities available to Jerry

Slide #8. There are subject matter clubs based on courses like Spanish and Chemistry. Anyone can join if he is interested and membership fees are very small. Meetings are on week nights.

Slide #9. Several special interest groups have clubs at Jerry's school. These include Photography Club, Music Club, Coin Club, Ji-Y, and others. These clubs can be joined by anyone interested. They often have projects or activities on week ends.

Slide #10. There are many music groups that Jerry could join. The orchestra, stage band, pep band, and other groups are open to students by trying out.

Slide #11. There are several opportunities for participating in student government. Besides running for student body office, there are committees planning school events and trying to solve various school problems. Meetings take place during class time, on week ends, or after school. Running for office requires that each candidate use his own money to campaign.

Slide #12. Jerry's high school participates in golf, tennis, football, basketball, baseball, swimming, and ice hockey. Practices are every night after school during the season with games on week nights or Saturdays depending on the sport.

Slide #13. The school sponsors intra-mural sports. Many of the organizations within the school have teams entered in the intra-mural league and anyone can form a team and play. Games are held during noon hours and after school. Teams decide on their own practice schedules.

Slide #14. A work-study program has been started at the high school. The students in the program take four subjects in the morning. They are placed on a job in town each afternoon and receive pay for their work.

Alternative Solutions to Jerry's problem.

Slide #15. Alternative #1--Not to participate at all.

Slide #16. Alternative #2--To go out for varsity sports.

Slide #17. Alternative #3--To participate in school government during the first half of the year and then to go out for sports the second half, after his term of office is over.

Slide #18. Alternative #4--To join the music club and to combine that with being in the work-study program.

Slide #19. Alternative #5--To join a club and to form a team from the club to participate in the intra-mural sports program.

Slide #20. Alternative #6--To participate in everything concerned with music. Join the music club, pep band, orchestra, and other musical groups.

Possible Outcomes of Jerry's Alternatives.

- Slide #21. Alternative #1 Possible Positive Outcomes 1) might improve his grade point average; 2) might get some reading and studying done that might help him get into college or vocational school. 3) might have time for a part time job or his hobbies.
- Slide #22. Alternative #1 Possible Negative Outcomes 1) some schools and colleges think students' being in school activities is important. Jerry might hurt his chances by not being in any activities; 2) probably won't meet as many new people; 3) won't have as much opportunity for regular physical exercise.
- Slide #23. Alternative #2 Possible Positive Outcomes 1) might be a good opportunity for developing physical abilities; 2) might meet friends involved in sports; 3) might get prestige from being on school teams; 4) colleges might be interested in his athletic ability.
- Slide #24. Alternative #2 Possible Negative Outcomes 1) might take a lot of time; 2) might hurt grades; 3) might cut out possibility of other activities or a part time job; 4) might cut down on his time for hobbies and for music; 5) might receive physical injury.
- Slide #25. Alternative #3 Possible Positive Outcomes 1) combines two alternatives he's interested in and gives him the variety he likes; 2) might meet a wide variety of new people; 3) both might help his chances of being accepted by colleges and by other post high school educational opportunities.
- Slide #26. Alternative #3 Possible Negative Outcomes 1) both these activities might be very time consuming. Little time for job or hobbies. 2) might receive physical injury from sports. 3) many student government activities are during class time. 4) running for office takes money for campaigning.

- Slide #27. Alternative #4 Possible Positive Outcomes 1) might improve both music skills and skills for future jobs. 2) might be able to save money for after graduation from high school. 3) being in work-study program might improve his chances for some vocational or educational opportunities after graduation from high school.
- Slide #28. Alternative #4 Possible Negative Outcomes 1) might not be able to take all the school courses he should or wants to because of working during part of the school day. 2) being in work study program might lessen his chances for acceptance at some colleges. 3) these activities might not carry as much prestige as some others.
- Slide #29. Alternative #5 Possible Positive Outcomes 1) might meet many new people through both club activities and intra-mural sports activities. 2) might take less total time than some other activities and leave time for hobbies. 3) might get a variety of physical exercise.
- Slide #30. Alternative #5 Possible Negative Outcomes 1) these activities might not have as much prestige as some other activities. 2) music club--might not want to participate that much in intra-mural sports. 3) Some colleges would want more activities than that on a student's record.
- Slide #31. Alternative #6 Possible Positive Outcomes 1) he would develop his music ability. 2) might meet some new friends.
- Slide #32. Alternative #6 Possible Negative Outcomes 1) might be bored by spending so much time in one interest area. 2) might not do well in anything because of being in too many groups and some activities of various groups might conflict.

APPENDIX F

OBSERVATION FORM FOR
EXPERIMENTAL ASSISTANT

Name _____

Jerry's Problem

Env. #1 Slides		Env. #2 Slides					Env. #3 Slides							Env. #4 Elides			Env. #5 Slides			Env. #6 Slides			Env. #7 Slides			Env. #8 Slides			Env. #9 Slides		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	21	22	16	23	24	17	25	26	18	27	28	19	29	30	20	31	32
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Solving a Personal Problem

	Person A	Person B	Person C	Person D	Person E	Person F
Photograph						
Life History						
Interests						
Abilities						
Values						

APPENDIX G

CONTENTS OF INFORMATION PACKETS INCLUDING TAPE CARTRIDGE SCRIPTS USED IN PERSONAL PROBLEM-SOLVING SIMULATION

Alternative #1

Envelope #1. Photograph of Susan.

Envelope #2. Life History--Susan was born in the south. She has one brother and went to college. Susan hopes to finish her college work someday. During high school she was in a bad auto wreck, but she has slowly recovered. Her ability in sports is about average.

Envelope #3. Susan's Interests--Susan is very interested in teaching children, and likes to be outdoors enjoying nature. She plays sports and especially enjoys swimming. Music and reading are her hobbies. Though not very interested in cooking, or traveling, she likes to be involved in a variety of different activities. Susan watches TV only as company for doing housework. She is interested in current affairs and politics and likes to work on civic improvement projects.

Envelope #4. Susan's Abilities--In school, Susan did well in English, history, and music; about average in math, physical education, and science; and not very well in her business courses; she reads faster than most other girls, and enjoys discussing what she reads. Her vocabulary is fairly large; she speaks well, and she expresses what she thinks effectively. However she feels weak in math and doesn't understand mechanical things. She sews well but has never learned much about cooking.

Envelope #5. Susan's Values--Susan thinks a person's family is very important. Her main goal now is to make a happy home for her husband and children. Someday Susan would like to finish her college degree. She enjoys talking with people but finds it hard to accept or to agree with many

Envelope #5 (continued)

of the things they do. Though she has some outside activities in the community, Susan feels these activities are not too important. She would like to take a long vacation. Susan feels that by creating a happy home and raising her children to be good people that she is doing the most important thing possible.

Alternative #2

- Envelope #1. Photograph of Leon.
- Envelope #2. Leon's Life History--Born in western United States, Leon was seriously ill when he was young but recovered and is now in good health. His family moved several times so he attended several schools while growing up. He decided to try and make schools better by becoming a school counselor. He worked part time to help pay his way through college. During college he got married and he and his wife now have three children. He is now a counselor at a local high school.
- Envelope #3. Leon's Interests--Leon plays golf whenever he can. He also enjoys tennis and swimming. He likes to come to work each day because he gets to talk with many different people. It's rewarding for him to try to help other people. He doesn't like clerical tasks like filling out forms and doing mathematical problems. Reading and music are his favorite hobbies. One of the things he doesn't like is to be in the spotlight or to be the leader of an activity.
- Envelope #4. Leon's Abilities--Leon finds it easy to talk to people. He also has considerable ability in writing but is not very good at math or at figuring out puzzles and analytical kinds of things. He is about average in his physical abilities (e.g., sports).

Alternative #2 (continued)

Envelope #5. Leon's Values--Helping other people is the thing that's most important to Leon. He feels his work allows him to do this somewhat, but not enough. He doesn't belong to any church and sees no need for religion. If he can feel that he's helping other people, he's happy. Politics and other such things are all less important than the feeling of helping. He is not particularly interested in making a lot of money--just enough to keep his family supplied with the necessities.

Alternative #3.

Envelope #1. Photograph of Shirley.

Envelope #2. Shirley's Life History--Shirley had a nice home but felt that her parents didn't really care about her. She ran away several times and on one occasion was given some drugs by a friend. During the 11th grade she dropped out of school and left home permanently. She is now looking for a job and is 20 years old. Since she left home two major things have happened to her. First, she was in jail for a robbery she committed to get money for drugs. Second, she has been confined to a hospital where she managed to stop taking drugs.

Envelope #3. Shirley's Interests--In junior high school Shirley was interested in sports and in music. Then she lost interest in all of school except math, and now isn't sure what she's interested in. She likes to be with other people but is afraid because most people she knows now would get her back on dope. She's not interested at all in men anymore and avoids most social situations. Her main interest now is to get a job and to have a chance to start over again and to stay away from drugs.

Alternative #3 (continued)

Envelope #4. Shirley's Abilities. Shirley isn't in very good health anymore so her physical abilities are below average. However, during high school she did learn to type and take shorthand a little and has been practicing these skills on her own. She has considerable ability in the areas of secretarial work and in mathematics. As far as her musical and other abilities are concerned, she'll have to begin to develop them all over again.

Envelope #5. Shirley's Values--In the last five years Shirley's values have changed a great deal. Before, she cared only about doing whatever she wanted to do or having fun. She feels she has learned a lot from her experiences but wants others to avoid going through what she has. She now thinks it is better to stay in a situation and work to make it better than to run away like she did from home and school. Getting a good education, finding people who will trust her, who will honestly care about her and will be her friends are the most important things to her now, along with getting a good job.

Alternative #4.

Envelope #1. Photograph of Dan.

Envelope #2. Dan's Life History--Dan was born back in Ohio in 1880. He moved out west as a young boy and still can remember somewhat about what the old west was like. He's worked on the railroad, in hard coal mines, and later in a factory until he retired about 25 years ago. He never married and now lives alone in a small apartment in California. He only finished the 6th grade in school, but is still alert and intelligent.

Alternative #4. (continued)

Envelope #3. Dan's Interests--Current events interest Dan. He has seen so much happen during his lifetime. He enjoys fishing and being outdoors. He has played around for several years with several inventions, and has a small workshop in his apartment in which he spends a lot of his time. He doesn't read much anymore but enjoys television.

Envelope #4. Dan's Abilities--Dan has always been physically strong and still goes for regular long walks each day. When young he was good at playing football, baseball and other sports. Though not a fast reader, and not very good at writing, he has considerable ability at building things, on discovering how things work, and in repairing them.

Envelope #5. Dan's Values--Though many things have changed, Dan thinks the world and people in general aren't much different than they were when he was a young man. He has always felt that doing what you want to do is the most important thing in life. Live your life for yourself and no one else is his motto. Dan's philosophy is that everybody's different and each person ought to go his own way.

Alternative #5.

Envelope #1. Photograph of Ray

Envelope #2. Ray's Life History--Ray was born during the early part of World War II, in 1941. He has several brothers and sisters and grew up in the Midwest in the state of Missouri. At first he planned on being an athlete. However, during college he spent a year in Europe and when he returned he decided to become a minister. He has not yet married.

Alternative #5. (continued)

Envelope #3. Ray's Interests--Always an active fisherman, Ray also goes skindiving. He attends sporting events whenever he can. Art is Ray's other major interest. Since his year in Europe, he has collected prints of famous paintings. The weekends are Ray's busiest time so he seldom dates. He doesn't enjoy doing anything mathematical or scientific, nor does he like TV. Ray reads a lot of books on many different subjects.

Envelope #4. Ray's Abilities--While in college, Ray did his best work in Psychology and Sociology. He was also above average in English, art and foreign languages. Once in a while he took a math or science course and did not do very well. Ray can write skillfully and is a very fast reader. He is somewhat nervous when meeting and talking with people. He works best with ideas and the expression of them through writing or art.

Envelope #5. Ray's Personal Values--Ray has tried to study what great men have thought was important in life. He now feels that there are certain true ideas that should be taught to everyone because they will help people to live better. Finding the truth and expressing it are the most important things to do in life. Life is very short and what we do here determines what our influence on others will be. Ray believes that we live on after we die through the influence we have had on others.

Alternative #6.

Envelope #1. Photograph of Margaret.

Envelope #2. Margaret's Life History--Margaret was born in a large city in the East. Her parents worked hard to send Margaret to the finest school they could find. She did well in school, participated in many activities and went to an exclusive women's college. After graduating, while

Envelope #2. (continued)

traveling in Europe, she met the man who later became her husband. He is an executive and they have a nice home in the best section of town. They have two children.

Envelope #3. Margaret's Interests--Margaret enjoys being with people, working on committees and organizing group activities. She works half time at a ladies' dress shop and spends most of her other time working in civic projects and fund raising drives for charities. She doesn't like being home because she feels too tied down. Though her husband wanted more children, Margaret felt she was too busy in her civic activities and other things more important to her. She wants to place the children in private schools as soon as possible to make sure they receive the best education.

Envelope #4. Margaret's Abilities--Reading novels and persuading other people by what she says are the two things Margaret does best. She's also quite good at math. She's not very strong physically and hasn't developed the skills needed to cook or to keep house. She finds it very difficult to talk to children. Margaret is also uncomfortable around adults who are not in her social group. She feels that she doesn't communicate with her husband much anymore.

Envelope #5. Margaret's Values--Margaret thinks that improving the cultural and social life of the community are the things that are really important in life. If a person will get the finest education possible and then become involved in improving the community, the person will be happy. What other people think about you is very important too, of course. Women should go into careers and should try to improve society. Margaret feels that religious and athletic activities are not valuable.

APPENDIX H
INSTRUCTIONAL SHEET
AND
INFORMATION PACKET PROGRAM

Name _____

Solving a Personal Problem

Directions:

Think of a problem you are facing in your own personal life right now. It may be something that you have been thinking about for sometime, such as "what career should I choose?" or "should I go to college?;" or it may be something that must be solved very soon, such as "who can I tell about what I've done?" or "there's a person I want to meet. How can I meet that person?" Write the problem you're thinking about on the next line if you want to. You do not have to write it down if you prefer to keep it to yourself.

Pretend that you want to select someone to work with you to help solve the problem you are thinking about. If you could select someone, whom would you choose? Information has been prepared on several people you might like to choose. The information is contained in the envelopes you see on the table. Notice there are 6 piles of envelopes, one pile for each person on whom information is available. A program is attached to this paper describing what information is contained in each envelope. Some of the information has been placed on tape cartridges and the assistant will, in a few minutes, show you how to use the tape recorder. Once you begin you may get information from as many envelopes and in any order you wish. At the end of ten minutes you will be asked to write the number of the person you selected down at the bottom of this page. You must remain in the room for the entire ten minutes. You may use all or part of the time to arrive at your choice. There are other materials in the room for your use if you choose to use some of your time on something other than the problem. Now give your attention to the assistant who will show you how to use the equipment.

To be completed at the end of 10 minutes

I have selected person # A B C D E F as the person I would want to help me solve my problem. (circle your choice)

PERSONAL PROBLEM-SOLVING SITUATION

Program of available information:

There are five information envelopes available on each of the six persons you might want to choose to help you solve the problem you are thinking about.

In each pile of envelopes is the following:

Envelope #1 contains a photograph of the person and his name.

Envelope #2 contains a tape cartridge. The tape contains a description of the person's life history. This means that it tells about what important things have happened in the person's life.

Envelope #3 contains a tape cartridge. The tape describes the interests of the person; that is, things he enjoys doing.

Envelope #4 contains a tape cartridge. The tape describes the things that the person does quite well and other things that he does not do very well; that is, his abilities.

Envelope #5 contains a tape cartridge. The tape describes the person's values; that is, those things that the person thinks are important in life.

APPENDIX I.

CHECKLIST FOR SOLVING PROBLEMS IN REAL LIFE

Directions: This is not a test. The purposes of this checklist are to find out how high school students solve problems in their personal lives and to discover if students would like help in learning how to solve these problems better. We are talking not about math or science problems, but rather about personal problems that come up from time to time in your life such as:

1. what courses to take next year
2. how to meet new friends
3. what vocation to select
4. how to get along better with your fellow students.

Step 1.

On the reverse side of this page, sign your name in the space provided and circle your present grade level. We need this information so that we can provide help in solving problems to the students who want it.

Step 2.

Read each of the statements on the reverse side of this page. These statements describe how people sometimes go about solving problems. Read each statement carefully. Then do the following:

Step 3.

If you usually do the behavior described when you solve problems in your life or the statement describes how you feel, place a check mark (✓) in the column marked "True" to the right of that statement.

If you do not do the behavior described when you solve problems in your life or the statement does not describe how you feel, place a check mark (✓) in the column marked "False" to the right of that statement.

For example, read statement number one. If you usually do consider many different ways to solve a problem before trying to solve it, you would make a check mark (✓) in the column marked "True." However, if you usually do not consider many different ways to solve a problem before trying to solve it, you would check the column marked "False"

Step 4.

As you make a check mark for each statement, circle the number of every statement that describes a behavior you'd like to improve. For example, read statement number one again. If you'd like to learn how to consider many possible solutions to a problem, circle number one, after you place the check mark in one of the answer columns.

Remember now that this is not a test.

Be honest and careful in making your answers. Your answers are confidential. They will be used to help students like you. Be sure to sign your name on the line on the reverse side of this page. This way your counselors and teachers will know which students would like help.

Begin now. Be sure to answer all the statements.

APPENDIX J. Name _____
STUDENT REACTION SHEET

Please give your reactions and comments about the guidance materials you have just worked with by answering the questions below.

1. Were the materials and problems with which you worked interesting?
2. Was enough information available for you to solve the problems presented in the materials?
3. Do you think these materials would be interesting to other high school students?
4. Are there ways in which these materials will help you solve your own personal problems more effectively?
5. Would you be interested in working with other materials like these in the future?
6. Make any additional comments that you would like about the materials in the space below.

APPENDIX K

SAMPLE SCORES ON DEPENDENT VARIABLE G

AND HOW THEY WERE OBTAINED

In order to illustrate in concrete terms the rationale and effects of the scoring system formulated for variable G, the following chart has been developed. Each of the three figures represents a manner in which a subject might distribute his selection of information packets in the Personal Problem Situation. In order to make the scores comparable, each hypothetical subject has been limited to 10 selections. The numbers in parenthesis represent the number of points awarded for each selection. In Figure A, a subject has given at least some consideration to as many alternatives as were available and has chosen to explore one of these alternatives in a great deal of depth. The subject represented in Figure B chose to ignore all but two of the available alternatives and make all of his selections from these two. Finally, Figure C illustrates a distribution of information selection which considers many alternatives and, in addition explores each alternative to some degree. It can thus be seen that the same number of selections can be distributed in a number of ways and that the scoring system devised for variable G rewards both the consideration of a wide variety of alternatives and the exploration to some degree of each alternative as well. The strategy of selection used in Figure C yielded the highest score (54) in the three examples provided on the next page.

APPENDIX K (continued)

SAMPLE SCORES ON DEPENDENT VARIABLE G
AND HOW THEY WERE OBTAINED

Figure A

		Alternatives						
		#1	#2	#3	#4	#5	#6	
P a c k e t s		#1	x(5)	x(5)	x(5)	x(5)	x(5)	x(5)
I n f o r m a t i o n		#2	x(4)					
	#3	x(3)						
	#4	x(2)						
	#5	x(1)						

Total Score 40

Figure B

		Alternatives					
		#1	#2	#3	#4	#5	#6
P a c k e t s		#1	x(5)	x(5)	x(5)	x(5)	x(5)
I n f o r m a t i o n		#2	x(4)			x(4)	
	#3	x(3)				x(3)	
	#4	x(2)				x(2)	
	#5	x(1)				x(1)	

Total Score 30

Figure C

		Alternatives					
		#1	#2	#3	#4	#5	#6
P a c k e t s		#1	x(5)	x(5)	x(5)	x(5)	x(5)
I n f o r m a t i o n		#2	x(4)			x(4)	
	#3	x(4)				x(4)	
	#4				x(4)		
	#5			x(4)			x(4)

Total Score 54

