ABSTRACT

STIMULATING VOCATIONAL EXPLORATORY
BEHAVIOR THROUGH USE OF
LIFE-CAREER STUDIES

By

David Bennett Youst

This investigation was designed to develop and evaluate new materials which would stimulate young people to exhibit increased vocational exploratory behavior, vocational knowledge, and vocational maturity. Life-Career Studies evolved from attempts to overcome the limitations of printed media and of the "job facts" approach to career information.

For this study the occupation of computer programmer was presented in slide-audio form through the lives of three people, Al DeLucia, Sam White, and Mrs. Ann Naymik.

The audio portion included segments of the role model's own voice and, in addition, was pulsed to control the slide changes.

Because at least three people represented each job, a variety of working conditions, places of employment, and psychological satisfactions and dissatisfactions were

described. Each person's story was depicted in terms of his job situation (decisions, relationships, satisfactions), life style (home, family, activities), history, and future.

Three such presentations allowed each module to differ in what was presented. For instance, different life styles were shown; different ways of attaining similar positions were identified; a minority group was represented in a career; and a female role-model was provided.

The modular design of Life-Career Studies was formulated by the writer to be appropriate for the development of a multi-media data base of career materials. Each module could be indexed and retrieved to serve an endless array of uses.

In this study three versions of newly developed materials were experimentally compared to three existing occupational information treatments. Movies were used in two control groups; printed materials in one. Slide-audio presentations were used in the experimental groups. The experiment was replicated with male and female ninth graders in four high schools (two representing an inner-city climate, two outer-city) in the City School District of Rochester, New York. 391 students were involved in the total 7 x 4 x 2 factorial design. Three sessions were held with randomly selected groups of not more than twenty-four students. The first session was for

pre-testing, the second for treatment administration, and the third for post-testing. Sixteen separate scores extracted from eight instruments were analyzed to test the research hypothesis that ninth grade students presented with the experimental materials will score higher in vocational exploratory behavior, vocational maturity, and vocational knowledge than equivalent students exposed to control conditions.

No results were found which indicated differences between the experimental and control groups on any dependent variable; the null hypothesis could not be rejected for vocational exploratory behavior, vocational knowledge, or vocational maturity.

It had been expected that girls would score higher than boys on all measures. This was true, however, on only one of sixteen criterion scores. This was a pleasant surprise as was the response of the inner-city students. Higher scores had been predicted for outer-city students but this was true on only one of five significant main effects for schools. Inner-city students turned in more requests for career information, and, in general, responded eagerly to the opportunities presented to them.

This study was designed for replication in two inner and two outer-city schools. The assumption was made that variability is sometimes extremely great from school to school regardless of the socio-economic climate in which the building is located. Some evidence was

presented to substantiate this assumption, but not enough to be confident of it.

Other results indicated the possibility of differential effects of certain materials in inner and outer-city schools.

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A THESIS

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

College of Education

1969

ACKNOWLEDGEMENTS

The research to be reported was financed by the Rochester Career Guidance Project which in turn was supported by the Rochester City Schools, Eastman Kodak Company, New York State Employment Service and New York State Education Department.

Dr. Norman Kagan and Dr. Richard G. Johnson have provided much support and have, in effect, served as co-chairmen for this research. Appreciation is also acknowledged for the service of Dr. Norman Stewart and Dr. Charles Hughes as committee members. Dr. Walter Lifton has served as "advisor-in-residence" for several years and has provided the continuous stimulation so essential for the writer's professional development. Special thanks are also due Dr. David Krathwohl at Syracuse University; Dr. Robert Burnham, Richard Freund, Earl Kage and Dr. Keith Whitmore, all at the Eastman Kodak Company. Each spent many hours on experimental problems and provided special warmth and encouragement at the times they were needed most.

Mrs. Evelyn Williams has earned more gratitude than a paragraph can express. She brought order into a chaotic

office and made printed copy emerge from what had been a thousand scattered ideas. Thank you.

Nancy, Stacy, Shawna, Liesl - let's take a real vacation, one without thinking I should be doing something else.

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CHAPTER I

THE PROBLEM, RATIONALE, AND REVIEW OF RELEVANT RESEARCH

The investigation to be reported was designed to develop and evaluate new materials which would stimulate young people to engage in increased vocational exploratory behavior. The new materials (Life-Career Studies) were developed to overcome the deficiencies found in most existing occupational information; specifically the problems of incomplete content and the limitations of printed media.

The Need for the Development of New Materials

> What concerns me and my co-workers is that the same kind of rich consideration of personality dynamics that now dramatizes assessment and understanding of the client is not available in considering the role and function of work. We look in vain for a dynamic appreciation of work in terms of the individual's role, his self-concept or identity, the exercise of his attitudes and fulfillment of his values, status considerations and other related factors (Samler, 1961, p. 459).

In general, schools do little in an organized way to help make the "career" world real for students. In our society too few young people know what their parents' or neighbors' jobs are really like; how these adults feel about various aspects of their work; or how some adults

plan for career development. In fact, students are not usually inclined to seek information relevant to careers. Even when such information is presented to students, it seldom seems to be used adequately by them in life-planning.

In urban areas, especially, it is dramatically clear that current career guidance practices leave much to be desired. In particular, the number of urban students with histories of failure with printed information is staggering and the vast preponderance of available information is in such form.

Materials developed to meet the needs of today's students and schools must overcome the limitations of the "printed word" and must include information which places people in careers. They must be "realistic." Further, such materials and processes must be used in ways that will broaden a student's occupational perceptions and knowledge.

> Clearly a person's choice among occupations is limited to those about which he knows something. If a person has no concept of what an ichthyologist or an epidemiologist is or does, it can have no effect on his vocational decisions. For most people the range of possible alternatives from which to choose is greatly limited by the restricted range of information which they have concerning the world of work. Furthermore, the conceptions which people have of the activities performed by and rewards accruing to members of occupations are seldom based on actual experience and may be greatly at variance with reality (Vroom, 1964, p. 76).

Such materials should also meet the following expectations held by Pritchard (1962):

> (Occupational exploration) ... must help the individual to become aware that both he

> and occupations have been, and will continue, changing and choosing; that he and jobs will affect each other and will both be affected by a complex of other factors - many of them unforseeable; that he is not confronted totally by absolute constants in either himself or the world of work but is confronted with learning how to guide and utilize change in his behalf - with how to grow vocationally (p. 676).

Samler (1961) also criticizes how current occupational information is gathered (job analysis) and displayed to students.

> It is quite interesting that the greatest contribution in (current occupational information) seems to be made not by the text but by the occasional picture which typically reveals the expression on the face of the worker, his posture, his inferred relationship with the person interacting, something of the important relationships ... It should be crystal clear that the picture occupational information presents today is one of the Economic Man. It is a one dimensional portrayal of man who, contrary to the soundest of folk wisdom, lives by bread alone (p. 459).

In part, schools suffer because, aside from printed materials, so little is available and because what is available in printed form is, in general, uninteresting. D.O.T.-type job descriptions and average work conditions tell little about how one individual can enter the world of careers and move through it. Obviously, many different types of people can enjoyably and successfully handle similar jobs and, likewise, similar types of people can be satisfied by widely differing job situations. Pritchard (1962) put it this way:

> The readily available materials and systems are or strongly tend to be, "stimulus bound"

> to the givens of old-line approaches standardized on classical trait-and-factor conceptions of vocational counseling and adjustment. At the least, improvements must provide some knowledge of the range of possible satisfactions in given jobs as well as something of the pressures and relationships in the work situation (p. 676).

Motivational materials and processes with the capacity to excite students are needed badly. Life-Career Studies were developed to meet this need. They are slide-audio stories of people at work and at home. Each job is represented by at least three people, one of whom is usually a woman, and another a member of a minority group. In addition to providing role models, the materials attempt to convey samples of the kinds of decisions workers are faced with on their jobs. Each person's history and aspirations are described to provide a sense of realism and of career development throughout life.

The place of work in each person's life style should be apparent when materials are properly developed. They should also satisfy the criteria which O'Hara (1968) developed in a recent article:

> For the growing and developing boy or girl, ... the value of the information does not lie in its up-to-dateness, but in its capacity to lead to an increased understanding of career developement in the world of work (p. 640).

The Need for Experimental Research

The study was also designed to overcome a second type of problem, the limited amount of experimental research carried out in the field of career guidance. This concern

has been expressed by Brayfield and Crites (1964) as follows:

> Vocational guidance research has leaned heavily upon non-experimental methods. The determination of group difference and correlational analysis are the most frequently used methods, incorporated in designs which limit the inferences that can be made regarding causal, or more properly, functional relationships. There is a dearth of experimental field studies of occupational behavior ... There has been so little laboratory experimentation on vocational problems that we appear to appreciate neither its possibilities nor its limitations (p. 315).

Holland (1964), after reviewing research on vocational behavior carried out by Flanagan, Holland, Roe, Super and Tiedeman, also criticized the degree to which correlational studies were being depended upon to relate vocational behavior to other variables in the absence of adequate experimental controls. Previously, other researchers such as Sinick and Hoppock (1961) have called for more experimental research on the uses of occupational information. Specific to the present study is the charge by Super, Tiedeman, and Borow (1961) that inadequate research on the nature and role of exploratory behavior in vocational development is one of the unresolved research issues in vocational theory. The study to be reported attempts, in part, to respond to this charge by evaluating newly developed materials with an experimental investigation.

The experimental work which stimulated the present investigation, although quite limited, has attempted to

develop and evaluate methods of increasing the vocational exploratory behavior of high school students. Included is the work of Jones (1966) at Stanford who experimentally evaluated the effectiveness of career films which varied in the degree of response which they elicited from students. Jones produced his films as an attempt to show that greater overt student response to simulated problems in career films would produce increased amounts of vocational exploratory behavior. The work of Jones has been extremely important in the formulation of this study, and it will be discussed in greater depth later.

Other experimental work which attempted to increase vocational exploratory behavior has also been carried out at Stanford. Johnson (1967) experimentally tested the effectiveness of the difficulty level of simulated vocational problems in encouraging career exploration. Various other guidance and counseling techniques were used to achieve these same ends by Schroeder (1964), Krumboltz and Schroeder (1965), Thoreson (1964), Krumboltz and Thoreson (1964) and others. The most important outcome of these studies for the present investigation was the development of techniques to elicit self-reports of information-seeking behavior. The Vocational Exploratory Behavior Inventory as used by Jones (1966) was modified slightly and used in the present study as one measure of vocational exploratory behavior.

Purpose

It is the purpose of this investigation to experimentally evaluate the relative effectiveness of three versions of newly developed Life-Career slide-audio stories. Controlled contrast is provided by the inclusion of three other motivational methods, one using printed materials (career briefs) and two using 16 mm films. The research to be described attempted to encourage career exploration and, in general, to motivate students to take a more active role in determining their own futures.

Research Hypothesis

It is hypothesized that slide-audio versions of Life-Career Studies will be more effective than materials currently available in stimulating students to engage in vocational exploratory behavior, in increasing vocational knowledge and in increasing vocational maturity.

Theory - Rationale for Experimental Criteria

Many forces in our society are sometimes critical of the degree to which young people are prepared in school to exert purposeful control over their educational and career development, and it has become generally agreed that most students could profit from greater awareness of and involvement in the career worlds around them.

The dependent variable designed to assess the "involvement" phenomenon was vocational exploratory behavior.

The rationale guiding this investigation is heavily dependent on the work of Jordaan (1963) who defined vocational exploratory behavior as ...

> activities, mental or physical, undertaken with the more or less conscious purpose or hope of eliciting information about one's self or one's environment, or of verifying or arriving at a basis for a conclusion or hypothesis which will aid in choosing, preparing for, entering, adjusting to, or progressing in, an occupation (p. 59).

Jordaan applies to the process of career development the work of experimental psychologists such as Berlyne and Harlow as they have been concerned with the nature of an "exploratory drive" and exploratory behavior in general.

Since Jordaan's article, Berlyne (1965) has written:

> ... When drive or arousal is driven upward by an encounter with an exceptionally novel, surprising, complex or puzzling stimulus pattern, exploratory behavior is likely to supervene, and the intensificiation of stimulation and accrual of information that results, serve to bring the drive down again. This reduction in drive (perceptual curiosity) may provide reinforcement facilitating the retention of the information in question and strengthening the subject's inclination to engage in exploring activity in comparable situations (p. 253).

The desire to answer questions has been identified by Berlyne (1954) as <u>epistemic curiosity</u> and is differentiated from the desire for increased perception of stimuli (perceptual curiosity). This latter form of curiosity is postulated to lead to <u>diversive</u> exploratory responses (responses which arise when a subject seeks out any stimulus that offers novelty, surprise, complexity or variety), while

specific exploratory responses supply the information necessary to fill a gap in the learner's knowledge. Four information-gathering responses are specified by Berlyne as, orienting, locomotor, investigatory, and epistemic. The latter category is conceived as the process by which knowledge is acquired, stored, retrieved, and utilized; the stimuli and processes are primarily symbolic.

Jordaan (1963) described situations which can give rise to epistemic exploratory responses:

> Situations in which the individual is confronted with a pressing but perplexing problem, an ambiguous situation, or a gap in his information. Such situations, because they tend to evoke competing response tendencies, frequently give rise to uncertainty and conflict.
>
> Situations in which the individual encounters, in others or himself, contradictory or ambiguous beliefs, expectations, attitudes, evaluations, perceptions, or the need for an explanation. In such situations the individual experiences not only uncertainty but also what Berlyne calls conceptual conflict. If these are great enough they lead to attempts to resolve them by procuring additional information and knowledge (p. 45).

In Jordaan's terms, "the chief function of exploratory responses is ... to obtain additional information about some aspect of the environment" (p. 43).

With regard to instructional processes, Bruner (1964) has stated that "the major condition for activating the exploration of alternatives in a task is the presence of some optimal level of uncertainty" (p. 309). This "optimal level of uncertainty" seems to parallel Berlyne's concept

of arousal and the situations described by Jordaan which may give rise to exploratory responses, i.e., ambiguous situations, contradictory beliefs, gaps in learner's information, etc.

One goal of the present investigation was to develop stimulus materials with the capacity to activate the exploration of alternatives; to generate in a young person an "optimal level of uncertainty" due to "gaps in his knowledge" regarding his career alternatives.

O'Hara (1968) phrased it this way:

> All vocational learning is a function of motivation. The student acts to satisfy his vocational needs. Unless he has a vocational need, he will not pursue a course of action, nor will there be any vocational learning. The presence or absence of vocational need determines whether or not vocational action will result in a given situation. The action resulting from this state is an effort to produce a state of vocational satisfaction. The quality and quantity of the dissatisfaction will determine the extent of the vocational activity of the student. The vocational responses of the student are determined by the nature of the situation and by the learner's condition of vocational readiness (p. 637).

Jordaan (1963) has conceptualized such behavior essentially as attempts to solve problems; initiated because an individual "... is confronted with or experiences a problem, need, want or lack" (p. 54).

Vocational exploratory behavior in this study is the "vocational activities" and "vocational responses" to which O'Hara makes reference in his article, "A Theoretical Foundation for the Use of Occupational Information in

Guidance."

Some cautions need to be injected here with regard to use of the phrase career exploration. It has been used in many ways. Ginzberg et.al (1951-1957) describe the career choice process in three stages: fantasy, tentative, and realistic choices. The exploratory substage, first in the realistic choice period, is summarized by Jordaan (1963) as the time during which

> The individual wants to know as much as possible about himself and about the outside world, tests himself in new experiences, and goes in search of new perspectives and experiences in order to increase his understanding of reality (p. 50).

Likewise, in the career pattern study monograph, Super (1957) describes exploration as the "stage in which choices ... are tried out in fantasy, discussion, courses, leisure activities, part-time work and finally in a beginning job" (p. 40), but Super in the Psychology of Careers (1957) also uses the term exploration to explain the processes by which adolescents attempt to develop and implement a realistic self concept.

> Adolescence is, clearly, a period of exploration. It is a period in which boys and girls explore the society in which they live, the subculture into which they are about to move, the roles they may be called upon to play, and the opportunities to play roles which are congenial to their personalities, interests, and aptitudes ... (p. 81).

Exploration in this use is now more than a stage, it is a process.

School people, too, have long talked about the need for student exploration, but almost always in terms of programs and group activities rather than individual learning behavior processes. The typical Junior High exploratory program in industrial arts serves as a good example. The emphasis is most often on the program rather than on desired individual outcomes. This study will use the phrase "exploratory behavior" in the specific sense which has been previously defined by Jordaan (1963). In this framework "... exploration can occur in any life stage, and particularly during the period preceding and following entry into a new life stage" (p. 52).

The criteria under consideration in this investigation were directly observable or verifiable information-seeking activities and changes in knowledge, attitudes, and subsequent behavior which could be assumed to be the result of vocational exploratory behavior. Jordaan postulated as possible outcomes of vocational exploratory behavior, twenty changes, among which are found: Increased and more specific knowledge of occupational possibilities (availability, character, requirements); greater awareness of the ways in which people and occupations resemble or differ from one another; increased confidence in, or commitment to, his objectives; and clearer understanding of the bases on which certain decisions which are confronting him should be made. Implicit in Jordaan's formulations are some of the basic

attributes which several theorists have used to define the concept of vocational maturity.

Super in 1955 described vocational maturity as a continuously developing process which could be thought of along five dimensions: orientation to vocational choice, information and planning, consistency of vocational choice, crystallization of traits, and wisdom of vocational choice. Super's construct includes, in addition to occupational selection, attitudes toward decision-making, comprehension and understanding of job requirements, planning activity and ability, and the development of vocational capabilities.

Crites (1965) built on Super's concept and defined vocational maturity as "... the maturity of an individual's vocational behavior as indicated by the similarity between his behavior and that of the oldest individuals in his life stage" (p. 259). Crites developed a model in which he specified four dimensions of vocational maturity: consistency of vocational choice, wisdom of vocational choice, vocational choice competencies, and vocational choice attitudes. Each of these general factors is somewhat independent and can be further delineated. For example, vocational choice competencies involve the cognitive processes of planning, problem solving, occupational information, self knowledge and goal selection, while vocational choice attitudes include the more affective characteristics of involvement in the choice process, orientation toward work, independence in decision-making, preferences for

choice factors, and conceptions of the choice process. Implicit in these many formulations is one characteristic of major concern for the present investigation, that is the degree of responsibility and control which an individual assumes for his own subsequent development.

Review of the Relevant Research

> Effective research evaluated media designed to supplement individual and group procedures in educational and vocational counseling are virtually nonexistent (Jones, 1966, p. 119).

It has been mentioned previously that the present investigation has been stimulated in large measure by the work of G. Brian Jones, "Stimulating Vocational Exploratory Behavior through Film Mediated Problems Programmed for Student Response" (1966). His study will be reviewed and implications for the present investigation will be described in this section. In addition, several other experimental works will be briefly reviewed.

Jones, with the support of the California Bankers Association, developed a 16 mm black and white film for the purposes of stimulating young people to engage in increased amounts of vocational exploratory behavior and to increase their inventoried and expressed interests in the banking field. Five careers in banking are covered in the film material. They are: computer programmer, bank teller, trust officer, operations officer, and lending officer. The following criteria were used in the selection of these positions:

- The positions must represent a cross section of employment opportunities in banking, a variety of entry level requirements must be represented.
- The positions must be open to men and women.
- The positions must not be glamour jobs to which students would aspire on the basis of superficial information.
- The position must not involve rare or unusual skills.
- The position must have some current social demand as well as possess good future employment prospectives (p. 56).

The film was designed to incorporate the variables of realism, social modeling and problem solving into its content and use.

> In all versions, the audiences first see a male Caucasian student, who has just returned from a visit to a number of banks, talking to his counselor. The student then serves as a guide, leading the audience through the five problem situations -- each one acted in a bank by regular bank employees. Student - counselor conversation provides the transitional device linking the sequence of problems. After the fifth problem has been presented and resolved, the counselor and student note that there are many more positions in banking than the one sampled; others are listed (some are accompanied by brief on-the-job film shots) and then they present the sixth problem. In the last problem the counselor asks the viewers what they should do next if their interest in banking careers has been stimulated and then he lists some possible exploratory responses, following which the film ends (p. 57).

> The problem solving exercises are introduced to the viewers by stopping the film. At this point the viewers turn to a workbook which accompanies the film. For each of the five problems experienced by the five banking employees, a series of objective questions was prepared so that

> six "true or false" responses had to be given in two minutes for each presented problem. All questions involved respondents supposing they were the employees and they had to decide how they would resolve the problems -- i.e., decisions had to be made (p. 58).

This film was called the active-overt participation film and required that students write their answers in the workbook.

Two other films were derived by changing the nature of the response required of the viewer. A second version also stopped the film but did not use a supplementary workbook and did not request students to write their answers; they merely thought about their answers and then compared them with the correct answers presented in the film. This version was called the active-covert participation film. A third film was developed which eliminated the problem-solving sequences entirely. It was called the passive participation film. This film required about thirty minutes to show as opposed to forty-five minutes for the first two film versions.

Jones attempted to evaluate the effectiveness of these experimental materials by comparing them with four control treatment materials. These included two short 16 mm. movies on banking which were spliced together to form a presentation which required about twenty-three minutes, a presentation of printed banking career information, a printed presentation of general career information, and a thirty minute black and white film which was not related to career development at all. Jones administered his seven

treatments to equal numbers of boys and girls in two high schools of different socio-economic class. One school was identified as being in a suburban community, the other "from a less economically privileged neighborhood." A total of 270 tenth grade students, who were enrolled in typing classes, served as the sample. Pre and post-measures were obtained on the Project Talent Interest Inventory from which Jones had extracted seventeen scales which were to measure a student's inventoried interests; a Job Interests List to measure student's expressed interests; and an Attitudes Toward Banking questionnaire which Jones developed. A post-measure of vocational exploratory behavior was obtained one month after treatments were administered. The instrument was modified from Krumboltz' Vocational Exploratory Behavior Inventory. In addition, subjective responses were obtained from students after they viewed treatment materials.

Analysis of variance and analysis of co-variance were used in a fixed-effects factorial design to analyze main and interaction effects. Jones' main criterion variable was vocational exploratory behavior, and he was not able to demonstrate any significant differences among the various experimental and control treatment groups. There were no significant differences on any of the criterion measures between the active-overt and active-covert participation films. However, when comparing these two films with the passive participation film, Jones was able to show a

difference in expressed interests and differences on two of the five inventoried interests. When the three experimental treatments were compared to the four control treatments, significant differences were obtained on the variables of expressed and inventoried interests as well as the attitudes toward banking. There were not, however, significant differences in frequency of vocational exploratory behavior. Jones also found that female subjects reported more vocational exploratory activities than male students and that they showed higher inventoried interests in banking occupations. Contrary to expectations, subjects in the high school from the less economically privileged neighborhood showed higher inventoried interests in banking occupations than subjects from the suburban middle class school.

Among Jones's conclusions and implications were the following:

> . None of these conclusions (above) was strongly supported by data on the one month follow-up measure of subject's vocational exploratory activities. This attempt to determine whether or not the various treatment materials produced different observable behavior effects proved to be disappointing. It could be that the experimental films were not powerful enough to influence observable behavior change even though self-reported interest and attitude change occurred. Also, it could be that one month is too long a period of time to wait for the administration of this follow-up measure. Perhaps the subjects tended to emit exploratory activities soon after treatment exposure and, one month later, had difficulty recalling these activities. On the other hand, perhaps a more sensitive instrument is necessary in order to measure subsequent

behavior which is specifically relevant to film content. There is also the possibility that attitude and interest changes are unrelated to observable behavior change. If such is the case, a value decision evolves for the film producer. He must decide what type of influence he wants the film to have and then orient film content toward that objective.

. The results which demonstrated the experimental films were less effective with male subjects and with subjects from the suburban middle class high school suggest at least two conclusions. If future films are to be more effective with males and with subjects in this type of school, they may have to be more closely tailored to the occupational and educational interests of these target populations e.g., perhaps more emphasis must be placed on college oriented jobs within an occupational field ...

. The results of this investigation seem to lend some support to the belief that vocational development processes of young people can be influenced -- at least temporarily. Just how permanent will be the V.E.B. changes evidenced by these subjects was not a concern of this study and therefore no longitudinal data have been collected (p. 130).

The outstanding strength of the Jones' study is simply that it is a carefully designed <u>experimental</u> study. One is confused, however, by viewing his film after reading the study. Where the elements of realism and social modeling are idealized in the text, in actuality, the black and white film is not particularly stimulating. The characters are obviously acting for the movie, regardless of whether they are acting their own roles. Jones rightfully calls for continued research on the differences between his treatment films (i.e. degree and type of response

required), but it is questionable whether more sophisticated research with an inadequate vehicle is worthwhile. The impact of mass media has developed a student population which is very sensitive to what is "real," and the strong possibility exists that had Jones' content and problem-solving procedures been presented in a more effective manner, greater effectiveness of treatment variables would result.

The opposite of this problem is exemplified in a 16 mm movie entitled, "Listen, Listen," which has recently been published by Ford Motors as a public service. It demonstrates the professional, "turned-on" use of the movie media. Modern guitar background music suddenly slides to the foreground as a ballad which then becomes the story line, listen, listen; flashing scenes of hand-holding on the beach, happy faces, puzzled faces, moving eyes -- a thousand shots -- all create an emotion-laden movie. It is "real" for the viewer in the ways it involves his emotions, however, it destroys this involvement through its content. Successful people are shown in stereotypic examples of career development. The Negro Mayor of Cleveland, an astronaut, even a machinist, become symbols, not of unique human development, but of success. The soft-sell moral is clearly present, "work hard, study hard, and you too can become Mayor of Cleveland." Reality fades.

It should be clear that the "reality" perceived by

the viewer depends upon the effectiveness of the wedding between media and content; each medium with strengths and limitations which must be accounted for. Few media guidelines are available for the development of motivational materials in career guidance.

The present investigation attempted to profit from the Jones' study by choosing the media carefully and by then checking the development of materials with experts in that media. Scientific precision loses ground rapidly to creative license in such circumstances.

In his conclusion, Jones made two suggestions which were followed in this study. He felt that one month after treatment administration was too long to wait before obtaining self-reports of vocational exploratory behavior. Two weeks was the period of time used in this experiment. He also identified a design weakness due to the pre-testing of all of his control groups. The present study utilized a no pre-test, no treatment, control group in each of the four schools.

A weakness of most current experimental studies is their reliance upon only one school to represent a socio-economic "type," (e.g., school in a disadvantaged neighborhood). To assess the variability among schools, this study used two schools each to represent the "inner-city" and the "outer-city."

Other research with a direct bearing on the present research includes a study by Sheppard, (1967) "Effects

of a Problem-Solving Procedure for Stimulating Vocational Exploration," also carried out at Stanford under the direction of Dr. John Krumboltz. Sheppard, like Jones, was primarily concerned about involving students through the use of problem-solving procedures. He compared this treatment with two others; one which used information about the field of accounting (as did the problem-solving group), and one which used general career information. Significant differences in amounts of information seeking behavior were not obtained, although greater interest in accounting (survey of degree of interest in 42 occupational titles) was apparently generated by the problem-solving procedure. Sheppard's research was limited to only one school in a "middle to upper-middle" class neighborhood and his control group, like Jones', was an "action-control." Sheppard (1967) states, "It probably would have been wise to have included an additional inactive control treatment with subjects receiving either no treatment materials whatsoever or non-occupational materials" (p. 97).

Another shortcoming of both studies is their failure to deal with possible effects of proctor differences. This is especially true of the Sheppard study where the researcher was involved as a proctor and interviewer for some students.

Another study which has implications for the present investigation is entitled, "Role Models: Their

Relationship to Educational and Occupational Behaviors," by Alan P. Bell (1967) under Donald Super at Teachers College. The impact of social-modeling was important in the Jones' study and the provision of role-models is central to the development of Life-Career Studies in the present investigation. Bell's study contains a good review of the literature on identification and role modelship. Data collected in the Career Pattern Study (Super) were analyzed to determine the relationships between significant role models at a given time and various subject characteristics.

Among Bell's conclusions may be found:

> The findings support the contention that the global concept of identification is too vague to be useful in assessing its effects upon educational and occupational behaviors ... . For example, it was found that a father may serve as a most important personal role model for his fourteen-year old son but not be the same kind of role model in the occupational sphere (p. 79).
>
> Spheres (educational, occupational, and personal) of role modelship are not at all related. Only at age 25 is there found a moderate relationship between occupational and personal role modelship (p. 75).
>
> Role modelship is a function of at least three different processes: a)perceived similarity, b) perceived object of imitation, c) perceived source of attitudes and values. These processes are not highly related to each other (p. 75).
>
> The need to specify role modelship more precisely is evidenced further in the moderate relationships which exist between role model types or relationships. A person may serve as a positive imitation but a negative assimilation role model in the same sphere (p. 79).

> Super and associates have named both identification with and rejection of role models as possible determinants of career patterns. Their importance may be more similar (sic) than it has been commonly realized (p. 84).
>
> The study's findings confirm the importance which has been assigned to role model availability and selection in the behaviors of adolescents and young adults. It has suggested ways in which new research may elaborate and extend these findings. Perhaps the importance of role modelship can be appreciated even further when one considers what the process of selection involves. It requires a knowledge of one's self, a commitment to a set of values or to a style of life, and a definition of self, which includes an acceptance of one's limitations as well as one's potential as these are personified or not in one's key figures. Perhaps it is this general disposition, a chief characteristic of maturity, which is reflected primarily in the role model variables and which is the chief determinant of later behaviors (p. 88).
>
> Ability, as measured by the Differential Aptitude Test-Verbal, is a requisite for the kind of self-and other-definition which is involved in the process of role model selection. Less able boys tend not to see their interpersonal relationships in these terms (p. 75, 6).

It would seem that the use of the phrases, "identification with" and "provision of role models," should be exercises in caution. Like the concept of "self-concept" (O'Mahoney, 1968), role modelship must be seen as a complex variable, differing through time, situations, and personal characteristics.

For the present study, support is given to the provision of three role-models for each occupation, especially since each role model is presented in the

occupational, personal, and educational spheres. The acceptance of some and the rejection of others (at least relative ranking) would seem to allow the student to "try on" a more complex pattern of a "man-in-career," than is available in traditional materials.

Summary

In this chapter the need for the development of new occupational materials was linked with the need for more experimental research in career guidance. Three experimental versions of new slide-audio materials called Life-Career Studies were developed and experimentally compared to determine their relative impact in stimulating vocational exploratory behavior, increasing vocational maturity (attitudes), and in increasing vocational knowledge. The psychological concepts of exploration, curiosity, and maturity provided the basis for operational definitions of the criterion measures.

The vast amount of research carried out in the field of career guidance is descriptive or correlational in nature; only a limited number of studies have been carefully controlled experimental investigations. The experimental work of G. Brian Jones at Stanford was especially important in the formulation of the present investigation, and it is reviewed in Chapter I. In Chapter II specific details are presented regarding the production of the experimental career materials and their experimental evaluation.

CHAPTER II

EXPERIMENTAL PROCEDURES AND DESIGN

The major purpose of this investigation was to develop and evaluate new occupational materials called Life-Career Studies. The development of these experimental slide-audio materials was based on the need and rationale discussed in Chapter I. In this investigation, two experimental versions of Life-Career Studies and a slide-audio presentation of material contained in the Occupational Outlook Handbook were compared with two 16 mm career movies and a presentation of printed career briefs. The dependent variables were vocational exploratory behavior, vocational knowledge, and vocational maturity (attitudes). A factorial design was chosen to assess the relative effects related to the experimental and control materials, sex of student, and type of school.

Life-Career Studies

The format for Life-Career Studies calls for three role models for each occupational area identified, e.g. Al DeLucia, Sam White and Mrs. Ann Naymik, computer programmers. Each man's and woman's story is illustrated

by the use of forty to sixty color slides and audio narration. The audio portion includes segments of the role model's own voice and, in addition, is pulsed to control the slide changes.

Because at least three people represent each job, a variety of working conditions, places of employment, and psychological satisfactions and dissatisfactions are described. Each person's story is depicted as follows:

- Identity - An attempt is made to make this person "real." His name is given, picture shown, occupational title and place of employment stated and shown, and his voice is used.

- Job situation - Physical, social, mental aspects of a job are presented. Typical arrival routines, relations with boss, peers, kinds of decisions encountered, leaving routines, etc. are described with emphasis on personal satisfactions and dissatisfactions.

- Life style - Off-the-job activities may include education, sports, etc. Family, home, neighborhood, method of transportation, relatives, patterns of socializing are included.

- History - The present job is seen as part of career development. This section includes educational, job and personal-social history. Emphasis is on the reasons why a person made the choices he did and his feelings about them.

- Future - Aspirations for self and family are described. Particular attention is given to immediate and long range career planning.

Three such presentations allow each module to differ in what is presented. For instance, different life styles are shown; different ways of attaining similar positions

are identified; a minority group is represented in a career; and a female model is provided.

The modular design of Life-Career Studies was formulated by the writer to be appropriate for the development of a multi-media data base of career materials. Use in such a guidance information system could ultimately be determined by a computer indexing and retrieval program based on specific user requests. The effectiveness of such systems will depend heavily upon the quality of multi-media content which can be utilized by them. Life-Career Studies offer a partial solution to such content and media problems.

The specific materials under investigation in this study were developed with the support of the Rochester Career Guidance Project, the Eastman Kodak Company and the New York State Employment Service. The materials were oriented to serve students in the Rochester area.

Choice of Job Title for Development of Materials

The occupation of computer programmer was chosen for this study after extensive consultation with representatives of the New York State Employment Service, Rochester City Schools, and members of the business and industrial community in Rochester. The reasons for this choice follow:

- It is a career appropriate for both males and females.
- It is a "demand" occupation and the accelerating need is far outdistancing the supply.

- A four year college degree is not strictly required for entrance into the career.
- In general, students are not very well informed about the nature of a programmer's job.
- The Rochester area has and will have many opportunities in computer related fields.
- Specific job tasks are not clearly apparent upon observation.
- The occupation is not readily observable to students in the Rochester area.

Choice of Role Models

The New York State Employment Service formulated a list of firms and agencies which maintain computer installations in the Rochester area, and their characteristics were compared. Three employers were selected so that different types and sizes of installations were involved. The employers had to agree to provide time for on-the-job interviewing and filming and had to agree to release the employee to visit a school occasionally should this be requested. The employer was requested to select an employee he judged to be successful, one who enjoyed his work and one who would probably continue to work in this occupational field for a few years. Moreover, the employer had to feel comfortable that the employee would fairly represent the firm and the career.

When a role model was identified he was given every opportunity to gracefully decline to participate. If he wished to participate he signed a release allowing non-profit use of the materials developed; he agreed to

cooperate in the interviewing and filming on the job and at home; and he agreed to talk with students about his job, life, and future, if such requests were made.

One employer felt that he did not employ a suitable computer programmer but offered to participate in any of several other career fields.

All role models accepted with enthusiasm. The first employer of three selected, identified a white male as his most appropriate employee. The second was asked for a suitable female or minority group member and was able to provide, with enthusiasm, a white female. The third employer, one of the largest firms in Rochester, highly recommended a black male. All employers, role models, and their families participated fully, once committed to the program.

A concomitant part of the development of a prototype Life-Career Study was the conviction that such materials need not be produced by professionals.

Amateur Production of Life Career Study

To demonstrate some ways in which people without technical training can produce occupational materials for local use, the writer served as a photographer, producer, interviewer and public relations administrator. Technical support and consultation were available upon request through the cooperation of the Eastman Kodak Company. Consultation was used regularly during each step in the production process and professional skills were used to: produce art

work and titles, "mix" the final audio tape, narrate the final audio track and edit the final version.

During the final editing no changes were made in the audio portion, but considerable reordering of slides did occur. The pulsing or timing of slide sequences was redone to improve the pacing of the Life-Career Study.

A pilot attempt to produce a Life-Career Study addressed itself to the problems of amateur photography and the need for motion in depicting work tasks. With the cooperation of the Eastman Kodak Company an automobile mechanic was photographed by a professional 16 mm. cinematographer, by an inexperienced apprentice using Super 8 movie film, by a professional still-photographer using 35 mm slides and by an inexperienced amateur who was handed a 35 mm camera at the shooting site. After reviewing the results of these four methods, it was felt that the slide format would offer the greatest flexibility and ease of handling, and that amateur photography should be attempted. An occupational data base maintained in slide-audio form would allow a limitless number of possible rearrangements of material. The question of where motion pictures are absolutely needed to realistically depict a work or home situation has not been adequately resolved. It appears that this decision must be made for each occupational situation encountered.

Technical Details - Photography

A 35 mm Olympus (Model 35) camera was used with Kodacolor X film. The camera was set for film speed ASA 125 and focused with its own view finder. All pictures were taken with available light and processed under standard developing conditions. Early in the production, high speed Ektachrome was used. It was shot at ASA 400 and "push" processed. This procedure was discontinued for three reasons:

- Filters were needed to account for various types of lighting and color correction is not easily made after the picture is taken.
- Slides are produced directly and therefore positive prints and duplicate slides are more difficult to prepare and are somewhat lower in quality than those prepared by a negative.
- The high film speed was not needed to produce visuals of acceptable quality.

The Olympus 35 camera is completely automatic, has an extremely quiet shutter, needs no attachments, and costs less than $70.00. This Japanese camera (now discontinued) was recommended for our purposes by the Director of the Photography Studio at the Eastman Kodak Research Laboratories.

Sound

Worker interviews were held in the on-site locations. A stereo Wollensak 1140 tape recorder and its standard microphone were used with 1½ mil. standard audio tape. This equipment does not record or reproduce interviews

within acceptable limits. Suitable recordings have been made using a Shure 315 s figure-eight microphone and the Wollensak recorder but a more powerful amplifier is needed to be heard by groups of students in various school settings. Sound editing was performed on a very old Audiocorder PT-6 tape recorder with a Gibson-girl splicer and standard splicing tapes.

Production Process

About three hours was spent with each role model. After introductions were made and acceptance declared, the writer usually spent a few minutes looking at the general work site. At this time plans were made for an interview to be recorded. At another time an interview was recorded at the work site. The information which was gathered included work situation, life style, history, and future aspirations. After this one hour period, the worker showed the work areas which he usually visits during a normal week. Photographs were taken along the way and very informal conversations occurred. An attempt was made to put the audio interview conversation into the perspective of the work site, work tasks, and work relationships.

Next, a half hour visit to the worker's home was made at a time when family members would be present. Informal discussions centered around family goals, living patterns, and history.

Another brief visit to the job site occurred before

a tentative script was prepared. This script was edited extensively before visuals were arranged and before the typescripts of the worker interviews were available. When it became apparent that certain pictures had not been taken, another informal visit was made to the work site. Scripts were shown to the role-models and their immediate supervisors for corrections and general approval. An attempt was next made to couple the slides with the script and the writer narrated the script onto audio tape. The resulting tape was not satisfactory and it was decided that a professional narrator would be used. The resulting audio script was edited by the writer and combined with segments of the workers' voices taken from the interview tape. This final tape was "mixed" and then pulsed to control slide changes. At this point a professional editor was consulted and several changes were made in the arrangement of visuals. Inexpensive art work was added and the audio tape was pulsed again to smooth out the slide changes.

Approval for this final slide-show was solicited from and enthusiastically granted by representatives of the three firms and by the three role models.

Sample

It was desired to sample a junior high school age population in Rochester and ninth grade was chosen as the grade where the school experiences of students were most similar. The typical grade arrangement in Rochester at

the time of the experiment was K-6 or 7 and 7 or 8-12. Although many parochial students enter public high school after grade 8, by November most ninth graders are fairly well established and secure in their respective schools.

Equal numbers of ninth grade male and female students were assigned to each of seven treatment conditions. Each student was exposed to only one treatment. One of the above mentioned groups was a post-test only, no treatment control. There were three active controls, two of which used films. The other control group received printed materials.

The experiment was replicated in four of nine high schools in the City School District of Rochester, New York. Madison and West High Schools were selected to represent the "core city" and Marshall and Charlotte, the "periphery" (outer city). Some characteristics of the schools may be summarized as follows:

TABLE 2.1

SELECTED CHARACTERISTICS

OF SCHOOLS IN SAMPLE

School	% Non-white	Dropout Rate % @ Yr.	% Continue Education	# In 9th Grade	Class Size, Mean
Charlotte	6.3	4.0	56.8	267	25.8
Madison	70.3	12.5	31.3	267	23.6
Marshall	7.0	4.0	51.3	313	25.2
West	44.4	3.7	51.5	271	24.2
City	24.7	6.0	47.9	-	

In each school a ninth grade class list which indicated the students' sex and homeroom number was provided. 168 students were selected at random in each school to form seven groups with twelve boys and twelve girls in each group. The actual number of students who participated in the experiment was less than twenty-four in every group because of absentees, suspensions, transfers, etc. Treatment conditions were assigned at random to the seven groups at each school.

Experimental Treatment Conditions

This study was undertaken to evaluate the concept of Life-Career Studies. In Chapter One several of the limitations of existing career information are discussed.

It was to help overcome the limitations of media, content, and reality that experimental treatment E_1 was developed. E_1 is a full Life-Career Study for the job of computer programmer. Experimental treatments E_2 and E_3 were developed to provide controlled contrast to E_1.

The seven treatment conditions were labeled and coded as follows:

E_1 - Life-Career Study - full version

E_2 - Life-Career Study - abridged version

E_3 - Occupational Outlook Handbook narrated script illustrated with slides contained in E_1 and E_2

C_1 - Printed occupational briefs

C_2 - Career specific film

C_3 - General film

C_4 - No treatment, post-test only

E_1 - Full Version of Life-Career Studies. Experimental treatment E_1 is 29 minutes long and includes 135 slides. It was shown in single-tray slide form and therefore required that a tray change take place. This change was made without stopping the audio script and without undue disturbance.

The narrator introduces Al, Sam, and Ann with their pictures followed by a few words in their own voices. He explains that each person will be seen at work, at home, and that their histories and futures will be covered. Al's story is followed by Sam's which, in turn, is followed by Ann's. The narrator concludes with,

"Computer programmers are employed in many other Rochester area business and industries ..." (Appendix A.1).

E_2 - Abridged Version of Life-Career Studies. Experimental treatment E_2 follows the same outline as E_1 except that Al, Sam, and Ann are shown only on the job. All material regarding life-style, history and future is eliminated. Presentation time is 17 minutes, and 75 slides are shown.

E_3 - A-V Version of Occupational Outlook Handbook. Experimental treatment E_3 uses visuals from E_2 but is a narrated version of information about the job of computer programmer contained in the Occupational Outlook Handbook. The same narrator was used in E_1, E_2, and E_3. Time for E_3 is about 16 minutes and 72 slides are used. This treatment was originally designed to remove the role models and basic type of content from the Life-Career Study format while maintaining the same media. It was not completely successful in this regard because of the appearance of the same people in several slides.

Control Treatment Conditions

Three active control treatments were selected to provide a comparison between existing materials and experimentally developed treatments E_1, E_2, and E_3. These selections were made among materials currently available for use in guidance-school settings. It is not claimed

that they are representative of such available materials. At the time this study was carried out, there were a limited number of booklets, no filmstrips, no records, no audio-tapes, and no movies available in Rochester designed to motivate career exploration through exposure to the job of computer programmer. One booklet of printed materials was assembled and two movies which relate to the computer field were used. One movie was specific to the job task of writing a program and the other contained very little specific information of any kind.

C_1 - Printed Materials. A booklet was assembled which included a typical career brief on computer programmer published by the Chronicle Press, a "story-type" brief published by Science Research Associates in its WORK kit, and the appropriate pages on computer programming contained in the Occupational Outlook Handbook. A twelve page booklet resulted. Students were requested to become knowledgeable about the information contained in the booklet and they were asked to indicate which of the three forms they liked best. They were allowed about 20 minutes. (Appendix A.2).

C_2 - 16 mm Film on Programming. This movie published by the Navy describes in detail the step by step logic required to write a program. Little mention is made about the job of programming and no role models are provided. The film is one of six used to train people in the basics of electronic data processing. The catalog

describes it as follows: "defines computer programming, explains what is meant by analyzing the problem, shows how a simple flow chart is prepared with symbols given their meaning, shows by use of the simple example how instructions to the computer are encoded in computer language."

This movie is about 15 minutes long, and was shown so that students did not see the publisher's title frame in the introduction or conclusion.

C_3 - 16 mm Film - Not Specific to Programming. In the movie, "IBM Means People" the world-wide operations of IBM are described in such a way that various job titles are mentioned in several international plants. Multi-racial role models are provided but little specific job-information is provided about any of the jobs mentioned. This movie is about 14 minutes long and is described in IBM's catalog as follows: "shows IBM-ers on the job at world-trade locations all over the world, graphically illustrates that the Company's greatest asset is in its people."

C_4 - No-Treatment Control. This group met only during the last session in each school. They were told that we needed their help in our study of vocational inventories and materials, and that we would appreciate their cooperation.

Experimental Procedure

The sequence of experimental activities during the Fall of 1968 follows:

- Month of September: Treatment materials edited, movies previewed, approval from Division of Planning and Research granted, approval from Division of Administration granted, approval from principals in the four schools granted, instruments to be used with students tried out.

- Week of October 14, 1968: Compilation of group lists (selected at random from ninth grade class lists).

- Week of October 28, 1968: First session held with students; administration of Vocational Development Inventory (VDI), Job Interests List (JIL #1) and Student Reaction Sheet (SRS #1).

- Week of November 4, 1968: Second session with students; administration of treatment conditions, Student Reaction Sheet (SRS #2), Information Test, Suggestions to Students List, and Request for More Information Turn-in Form.

- Week of November 18, 1968: Third session with students; administration of Vocational Development Inventory (VDI #2), Job Interests List (JIL #2), Vocational Exploratory Behavior Inventory (VEBI), and a Request to Meet a Worker in a Career-Field-of-Interest Turn-in Form.

- Week of November 24, 1968: Student requests for information filled and delivered to schools and student requests to meet a worker transmitted to the Junior Chamber of Commerce Guidance Committee through the City Schools' Department of Guidance.

- December through April: Results and tentative conclusions of study made available to staff and students at each school. Follow-up as requested by school staff.

Group Procedures

Each of the three sessions held with students lasted one period or approximately 47 minutes. Administrators in each session were given standardized instructions (Appendices B.1, B.2 and B.3) which specified procedures and asked them to read all statements to the students just as they were printed.

At no time were subjects told that this was an experiment. They were told that we were "studying vocational materials and inventories and that we needed their help." In each school the first three periods were used to meet the student groups. In the schools the groups were identified as follows:

E_1 was called Group 11

E_2 was called Group 12

E_3 was called Group 13

C_1 was called Group 14

C_2 was called Group 15

C_3 was called Group 16

C_4 was called Group 17

Each proctor met with the same group during each of the three sessions according to the following schedule:

TABLE 2.2

CALENDAR OF GROUP MEETINGS BY

PROCTOR, DAY, PERIOD AND SCHOOL

	Monday		Tuesday		Wednesday		Thursday	
Periods	Proctor X	Y	Proctor X	Y	Proctor X	Y	Proctor X	Y
	Oct. 28 Marshall		Oct. 29 Madison		Oct. 30 Charlotte		Oct. 31 West	
1	13	16	15	12	12	15	16	13
2	15	12	13	16	16	13	12	15
3	14	11	14	11	11	14	11	14
	Nov. 4 Marshall		Nov. 5 Madison		Nov. 6 Charlotte		Nov. 7 West	
1	13	16	15	12	12	15	16	13
2	15	12	13	16	16	13	12	15
3	14	11	14	11	11	14	11	14
	Nov. 11 No Contact		Nov. 12 No Contact		Nov. 13 No Contact		Nov. 14 No Contact	
	Nov. 18 Marshall		Nov. 19 Madison		Nov. 20 Charlotte		Nov. 21 West	
1	16	16	15	12	12	15	16	13
2	15	12	13	16	16	13	12	15
3	14	11	14	11	11	14	11	14
3	17	17	17	17	17	17	17	17

Group 17 was divided in each school with equal numbers meeting with each proctor during the third period during the week of November 18th. In this way each proctor met with all seven groups in inner as well as outer-city schools. Both proctors had experience as high school and elementary school Guidance Counselors and both felt comfortable working with ninth-grade groups in inner and outer-city schools.

Arrangements were made to administer all sessions without placing responsibility on any member of the school's staff. The project was explained in detail to the Principal, Vice-Principal, and ninth-grade Counselors in each school but little stress was placed on differences in treatment conditions and, in fact, no school personnel knew which group was assigned to a particular treatment.

Follow-up Procedures

During the second session in each school, some students requested more information about certain careers. This material was gathered with the cooperation of the New York State Employment Service and was delivered to the appropriate counselors in each school at the time of the last session with students. The counselors passed out the information to the students who had requested it. Lists of these requests were distributed to the counselors and administrators in each school.

At the last session in each school, some students requested an opportunity to meet and visit a worker in a particular career field. The resulting requests were passed on through the Rochester City Schools' Guidance Department to the Junior Chamber of Commerce, Career Guidance Committee. Contacts were made between people in business and industry and 93 ninth graders in four city schools.

In addition, as a result of the experimental work in schools, several counselors called for advice in arranging visits for students who did not participate in the experiment and, in one case, for a student who had already been expelled from school. These requests were enthusiastically undertaken. As data from this study became available, they were shared with counselors and administrators in each school.

Criterion Measures

The purpose of this study was to evaluate the degree to which innovative career materials could experimentally increase vocational exploratory behavior, vocational maturity and vocational knowledge of ninth grade students. The following criterion instruments were used: The Vocational Exploratory Behavior Inventory; The Attitude Scale of the Vocational Development Inventory, Form IV; A twenty-one item true-false test of knowledge about computer programming; and various response forms.

During the second session with students, materials were used which were specific to one occupational field, programming. At several points during this session, directions were read to encourage students to explore broadly, not just in the programming field. The following is one example:

> The next sheet which you have been given is called "Suggestions." We believe that for anyone to make wise choices or decisions about a career, he should consider all alternatives and gather accurate information about his possibilities. Most of the information which you have received has been about the field of computer work, but these suggestions should be used to help you find out about any career that you wish to explore. Remember we believe that any choices you make in the future should be wise, informed choices based on accurate information.

Any resultant vocational exploratory behavior, therefore, was the primary dependent variable in this study.

Vocational Exploratory Behavior Inventory. This inventory asks students to describe in detail the amount of information-seeking behavior they engaged in during the two weeks immediately following the experimental treatments. Minor modidifications were made in Krumboltz' inventory as used by Jones (1966). (Appendix C.1) Students were asked to list, in specific detail, answers to questions such as the following:

- Have you obtained any printed information about any occupation? If so, what was it? Where did you get it?
- Have you had any contact with any person with whom you talked about careers? If so, who was it? Friend? Name. Your Teacher?

Name. A relative? Name. A person employed in that occupation? Name.

. Have you asked to see your counselor within the past two weeks to discuss careers?

. Have you investigated the possibilities of any part-time employment related to an area of your occupational interest? If "Yes", explain.

. Have you had a recent change in your occupational interests that may have led you to want to consider possibly changing your course of study in high school? Yes or No. I have talked with _____ about possibly changing my course of study.

. Have you made any plans to visit any place where people are employed in occupations that you are interested in? Yes or No. Name of place visited. Name of place planned to visit.

. Have you talked to anyone about the information you have gained from studying about occupations? Please give the names of any persons with whom you have had a discussion about your own occupational plans. Friend? Name. Teacher? Name. Counselor? Name. Others? Name.

Each student's score on this inventory was the number of exploratory responses he said he engaged in. He was asked to provide supportive data for each activity.

> This type of criterion measure has been found consistently to be a sensitive instrument in earlier studies which have successfully used it (cf. Krumboltz and Schroeder, 1965; Krumboltz and Thoresen, 1964; Thoresen, Krumboltz and Verenhorst, 1965). However, these studies used individual interviews rather than group administration of this instrument. Krumboltz and Schroeder checked on the accuracy of their subjects' reports of "information seeking behavior" by randomly selecting one'sixth of their subjects and attempting to verify all

> reported activities. Twenty-five out of thirty-four responses were confirmed, nine were unconfirmable, and none were proven false. Krumboltz and Thoresen (1964) followed up on eighty-five responses reported by eighteen subjects and confirmed seventy-nine of them, while the other six were unconfirmable. ...
>
> Krumboltz and Sheppard (1966) used a similar group administration procedure and replicated the above findings concerning the veracity of self-reported exploratory activities. (Jones, 1966, p. 76).

Jones (1966) used group procedures to administer the VEBI "... to standardize administration of the inventories and to complete the administration ... on the same day within each school." (p. 77) Neither his results nor the results of Sheppard (1967) indicated any reason to believe that VEBI group-administered self-reports were inaccurate.

Two other measures of information seeking behavior were obtained by counting the number of students who turned in the following forms: Request for More Information (Appendix C.2) and Request to Meet a Worker or Visit a Work Situation. (Appendix C.3)

During the administration of all treatments (second session) the students were urged to explore any career questions of relevance to them. They were given a list of suggestions of activities which they could attempt; (Appendix A.3) and one was to turn in the request for more information form. They did not turn in the form to their proctor during the group session but were required to deliver it to their own guidance office in person.

The other turn-in form was administered during the third session to all seven groups in each school and followed similar procedures.

Vocational Development Inventory, Attitude Scale. Vocational maturity was assessed by pre and post scores on the Vocational Development Inventory, (Appendix C.4) Attitude Scale, form IV, 1966. Crites (1965) developed the 50 item VDI to provide measures of:

> (1) The extent of involvement of the young person in the vocational choice process, i.e., is he actively concerned about choosing a vocation or is he passively waiting to see what happens to him? (2) The orientation of the young person toward his vocation, i.e., is he work-oriented or pleasure oriented? (3) The independence of the young person in his decision-making, i.e., how heavily does he rely upon others for advice and support in making a choice? (4) The preferences the young person has for the factors in a vocation which yield satisfaction, i.e., does he prefer extrinsic, concomitant, or intrinsic satisfactions from work? And (5) The conceptions which the young person has of vocational choice, i.e., does he see it as something over which he has some control or does he feel it is largely determined for him? (Crites, c, p. 2).
>
> The attitude scale is an empirically constructed inventory which assesses verbally stated vocational behaviors that presumably mature as the individual progresses through the educational system. (Crites, b, p. 3).

Extensive standardization data has been gathered actively since 1961. In a report on research with forms I and II, the Crites' (1965) Psychological Monograph concludes:

> ... first, verbal vocational behaviors are monotonically related to both age and grade,

> but are more frequently associated with the latter than the former. Second, a true-false response format provides better item discrimination between grades than a Likert-type rating scale. Third, items written in the first and third person singular produced essentially the same amount of item differentiation across age and grade levels. Fourth, the most notable trend in item response by age and grade was from predominantly true responses in the elementary school years to predominantly false responses in the high school years. ... it was found that there were very few differences between males and females and between schools in high and low rent districts on the items which differentiated between grades. In addition to the item analyses, several total vocational maturity score analyses were conducted which yielded the following findings: the average vocational maturity of the entire sample was at approximately the eighth grade; there was an increase in vocational maturity at all grade levels except the eleventh grade, which was atypical; the correlation of vocational maturity with age was .385 and with grade was .463; and the relationship between vocational maturity and deviation responses, which may indicate vocational maladjustment, was low negative ($r = -.20$). (p. 32).

Current work on the VDI Attitude Scale indicates that its use with a ninth grade population of boys and girls as in this experiment is appropriate.

Test of Knowledge about Computer Programming. A twenty-one item true-false test was developed from a seventy-item pool of questions. The original questions were written by several people and were based on information covered in the Occupational Outlook Handbook for Computer Programming. The original items were refined and used with several 8th and 9th grade boys and girls who had just read the Handbook. Based on their

difficulties and feelings, the writer selected twenty-one items which he felt covered the basic information necessary. (Appendix C.5) The final items were then checked against the treatment materials. The test content was covered in each of the three experimental treatment materials, the printed control materials, and partially in the Navy movie on programming. Finally, the test was submitted to programmers and managers in three Rochester computer installations for their suggestions. Only minor modifications were made before the test was used in this study.

Other Measures

Data was gathered on several other forms but the results were not designed to test the hypothesis under investigation. During the first and last sessions, students were asked to write the titles of jobs in which they had a current interest. This form was identified as the Job Interests List. (J.I.L. Appendix C.6) Subjective reactions were gathered on standard forms after students took the VDI during the first session (Appendix C.7) and after they were exposed to treatment materials during session two. (Appendix C.8)

Scoring

The Vocational Development Inventory (VDI) used a machine-scored answer sheet and was scored at the University of Iowa. The Knowledge-Test responses were

key-punched and machine processed by data processing personnel at the Eastman Kodak Company. Both instruments produced single scores which were used to analyze vocational maturity and vocational knowledge respectively.

Frequency count data was obtained on all four sections of the VEBI by counting the number of activities which students reported. The total score and the scores on each section were analyzed separately. Each turn-in form was counted as an activity when it was turned in to the school guidance office. A separate analysis was run on the VEBI total score plus the Turn-In 2 activity since this last turn-in form was administered after the VEBI (but on the same day).

Additional data was gathered on the Job Interests List (JIL) and two Student Response Forms (SRS 1, SRS 2). The JIL produced two scores. The first was obtained by counting the number of computer related jobs which students listed. The second was obtained through the cooperation of the New York State Employment Service. A professional Employment Counselor rated the first two jobs on each JIL according to the number of years of education which each required. These two scores were averaged and then used as a measure of occupational aspiration. The SRS #1 was used as a measure of student attitude during the first session. These forms were rated (+, -, or 0) by an experienced educator who had completed advanced graduate work at the University of

Rochester. He was unfamiliar with the experiment and rated all SRS's within a two hour period. The writer later concurred with each of his ratings. SRS #2 asked students to respond to three questions: How interested were you in the materials? What did you think of them? How much have they made you want to find out more about occupations? Each question had five possible responses which were coded (1-5) and analyzed separately. All response forms, not otherwise indicated, were tabulated and double-checked by a member of the Career Guidance Project clerical staff, who had no knowledge about the various treatment conditions.

Variability During Group Sessions

During the administration of group sessions several things occurred which may have limited possible effects due to treatments:

- Sound reproduction of the slide-audio experimental materials during session two was very poor and students in the E_1, E_2, and E_3 groups had to strain to understand some of the material. Corrections and adjustments were made during the treatment week but it was long afterward that the recorder was found to be slightly defective. (It distorted at high volume).

- In each school, several rooms were used to meet with the groups. Some areas used were a classroom, cafeteria, auditorium, basement multi-purpose room, hygiene classroom, etc. No major problems developed because of these diverse settings but the type of rooms used may possibly have had an effect. Some groups met in the same room for all three sessions

while others did not. Proctors usually had to change rooms each period.

. While both proctors were male, white, near 30, experienced with ninth graders in inner and outer-city settings, and thoroughly familiar with all treatments; several differences did exist. The writer served as proctor X and was familiar with personnel in three of the schools. Proctor Y had worked at Marshall High School two years previous to the experiment and was remembered by quite a few students and staff. Both proctors dressed similarly but physically are quite different. Voices, speech mannerisms, and methods of relating to groups varied but both proctors attempted to do the most effective job they could with each treatment and met before each day's session to review procedures.

. All directions and many criterion instruments were read aloud to all groups. This procedure was employed to insure understanding and to provide support for students with poorly developed reading and attention skills. Proctors held practice reading sessions to control timing, articulation, and emphasis. Students could work ahead but a majority in all groups chose to work along with the proctors.

. Each group began with a somewhat different "group attitude." Even though individuals were chosen at random, the processes by which each group initiated interaction varied widely. The order in which students entered the room, who else was there already, where others were sitting, how much ahead of time members assembled, where the girls (boys) were, and many similar factors appeared to be critical variables. The proctors attempted to use "good" leadership techniques but five members of Group 11 at Marshall were openly hostile to proctor X, Group 13 at Charlotte gave proctor Y a "hard" time, Group 14 at West was difficult during session one but very responsive during session two, etc. Unfortunately, no continuing measures of group responsiveness or attitudes were obtained during the

investigation. For the most part, attitudes seemed good and students participated willingly, if not at high levels of enthusiasm. After taking the Vocational Development Inventory during session one, many students indicated that it "made them think" and that they enjoyed taking it.

. There were undoubtedly other factors which influenced attitudes within each school. The willingness of the teacher to release a particular student and what else was happening in school that day are only two examples. The widely fluctuating tardiness and absentee rates are others. No systematic attempt was made to keep a record of such factors each week.

Hypothesis

This investigation was initiated to evaluate the concept of Life-Career Studies. The new materials were developed in the belief that they would be more effective than existing career guidance materials. The following directional hypothesis was tested:

> Ninth grade students presented with the experimental materials will score higher in vocational exploratory behavior, vocational maturity, and vocational knowledge than equivalent students exposed to control conditions C_1, C_2, and C_3.

The factorial design allows analyses of main and interaction effects due to treatment, school and sex. It was anticipated that students from schools in communities of higher socio-economic levels would score higher than students from schools in lower socio-economic communities. Female students were expected to score higher than male students, and it was expected that differences due to proctor would not occur. Additional

analyses were carried out to determine the relative effectiveness of the experimental treatments. Since E_2 and E_3 were developed as abridged versions of E_1 it was expected that they would not be as effective as E_1. Interaction effects involving treatment condition, sex, and school, were tested as null hypotheses.

Experimental Design

Data was gathered on five criterion measures to test the main hypothesis for the three dependent variables in this investigation. Additional analyses were carried out on three other measures. The eight measures yielded sixteen separate scores which were analyzed within the framework of a 6 x 4 x 2 factorial design. Five independent 2 x 2 x 2 analyses were performed for each criterion score using analysis of variance with adjustments made for unequal cell frequencies. In addition to the two levels of treatment in each analysis, two levels of schools (inner and outer-city) and two levels of sex were used. Further analyses were performed to account for differences within inner and outer-city schools. Since two proctors were involved but not cross-classified, additional analyses were performed to evaluate possible proctor differences. The Model I or "fixed effects" design (Edwards, 1960, p. 301) limits generalizations to the specific levels and combinations of levels actually investigated. Expected frequencies for the full design follow:

TABLE 2.3

EXPECTED NUMBER OF SUBJECTS IN EACH CELL OF THE EXPERIMENTAL DESIGN FOR TREATMENT, SCHOOL, AND SEX

	Schools		Treatment Conditions E_1	E_2	E_3	C_1	C_2	C_3	C_4	
OUTER	Charlotte H.S.	Male	12	12	12	12	12	12	12	84
		Female	12	12	12	12	12	12	12	84
	Marshall H.S.	Male	12	12	12	12	12	12	12	84
		Female	12	12	12	12	12	12	12	84
INNER	Madison H.S.	Male	12	12	12	12	12	12	12	84
		Female	12	12	12	12	12	12	12	84
	West H.S.	Male	12	12	12	12	12	12	12	84
		Female	12	12	12	12	12	12	12	84
	Total		96	96	96	96	96	96	96	672

The computer facilities in the Department of Management Systems at the Eastman Kodak Company were used for all statistical analyses. The computer programs which were used assume that data has been drawn from a fixed-effects research model, and therefore the appropriate within-cell mean square was used for all tests of significance.

CHAPTER III

RESULTS AND DISCUSSION

The analysis of sixteen separate criterion scores for eleven possible main effects and their interactions generates a large amount of data; so much that its full presentation in this chapter might hinder general understanding of the experimental results. While complete tables of results are presented in Appendix D, only selected data is included in this chapter.

The main hypothesis was phrased in the null form and tested for the dependent variables of vocational exploratory behavior, vocational knowledge, and vocational maturity. To partition the variability associated with six levels of treatment, the following five independent tests were run for each score: experimental vs. control materials ($E_1E_2E_3$ x $C_1C_2C_3$), Life-Career Studies vs. slide-audio version of Occupational Outlook Handbook (E_1E_2 x E_3), full Life-Career Study vs. abridged Life-Career Study (E_1 x E_2), printed available materials vs. available career movies (C_1 x C_2C_3), and specific career movie vs. general career movie (C_2 x C_3). Additional tests were performed to account for sex,

treatments, and schools; and differences between inner and outer-city schools, within inner-city schools, and within outer-city schools.

Because two proctors were used but not cross-classified in the experimental design, only those interactions free of possible proctor effects have been reported.

The 0.05 level of significance was used to test the null hypothesis that:

> Ninth grade students presented with the experimental materials will score the same in vocational exploratory behavior, vocational knowledge, and vocational maturity, as equivalent students exposed to control conditions C_1, C_2, and C_3. (H_o: $E_1E_2E_3 = C_1C_2C_3$).

Data was used from only those students who were present for all three sessions. Cell frequencies for all analyses follow in Table 3.1.

TABLE 3.1

ACTUAL NUMBER OF SUBJECTS

IN EACH CELL OF THE EXPERIMENTAL

DESIGN FOR TREATMENT, SCHOOL, AND SEX

	Schools		Treatment Conditions E_1	E_2	E_3	C_1	C_2	C_3	
OUTER	Charlotte H.S.	Male	9	6	8	7	7	7	44
		Female	7	9	6	7	10	7	46
	Marshall H.S.	Male	4	9	4	6	9	8	40
		Female	5	7	10	6	8	5	41
INNER	Madison H.S.	Male	3	8	7	8	3	8	37
		Female	7	7	7	3	7	3	34
	West H.S.	Male	6	6	7	7	6	9	41
		Female	7	5	7	11	8	6	44
	Total		48	57	56	55	58	53	327

Overview of Results

No evidence was generated in this investigation which would allow rejection of the null hypothesis for vocational exploratory behavior, vocational knowledge, or vocational maturity.

Results - Vocational Exploratory Behavior

Three instruments were used for the analysis of vocational exploratory behavior. They were the Vocational Exploratory Behavior Inventory (VEBI), a request for more information turn-in form (T-IN 1), and a request to meet a worker or visit a place of employment turn-in form (T-IN 2). The VEBI total score was combined with the T-IN 2 score to provide the primary criterion measure for this dependent variable. In addition, separate analyses were performed on each of the four subsections of the VEBI.

There were no significant main effects on the VEBI-total plus T-IN 2 score, but a difference between inner and outer-city schools occurred when the specific movie (C_2) was compared with the general movie (C_3). High scores in the inner-city schools were associated with the specific movie.

The VEBI-total + T-IN 2 scores are presented in table 3.2 and the analysis of variance results in table 3.3.

TABLE 3.2

MEAN SCORES FOR VEBI-TOTAL

PLUS TURN-IN 2

	Schools		Treatment Conditions					
			E_1	E_2	E_3	C_1	C_2	C_3
OUTER	Charlotte H.S.	Male	8.00	7.00	4.50	8.14	2.43	8.29
		Female	6.57	10.11	3.50	5.28	6.10	12.57
	Marshall H.S.	Male	3.75	9.55	8.50	4.16	8.55	5.75
		Female	8.80	3.43	5.70	3.33	6.12	4.80
INNER	Madison H.S.	Male	5.00	6.00	7.57	7.75	13.00	2.62
		Female	5.86	4.28	11.71	9.67	15.57	2.00
	West H.S.	Male	9.67	12.17	2.00	4.00	8.67	4.78
		Female	9.42	10.20	4.28	3.54	2.12	5.83

TABLE 3.3

ANALYSIS OF VARIANCE FOR VEBI-TOTAL

PLUS TURN-IN 2;

MAIN EFFECTS AND SIGNIFICANT INTERACTIONS

Source of Variation	Degrees of Freedom	Sums of Squares	Mean-Square	F*
G - Treatments	5	39.16	7.83	1.45
G_1 - ($E_1E_2E_3$ x $C_1C_2C_3$)	1	2.28	2.28	0.04
G_2 - (E_1E_2 x E_3)	1	12.18	12.18	2.25
G_3 - (E_1 x E_2)	1	2.28	2.28	0.42
G_4 - (C_1 x C_2C_3)	1	6.59	6.59	1.22
G_5 - (C_2 x C_3)	1	15.82	15.82	2.93
S - Schools	3	18.33	6.11	1.13
S_1 - (Inner x Outer)	1	4.46	4.46	0.83
S_2 - (Within Inner)	1	9.00	9.00	1.67
S_3 - (Within Outer)	1	4.87	4.87	0.90
X - (Male x Female)	1	0.58	0.58	0.11
G_5 x S_1	1	68.02	68.02	12.59*
Error	15	81.03	5.40	
Total	48	499.22		

* 4.54 is the critical F value at the 0.05 level of significance for 1 and 15 df; 3.29 for 3 and 15 df; and 2.90 for 5 and 15 df.

TABLE 3.4

MEAN SCORES FOR VEBI-TOTAL

	Schools		Treatment Conditions E_1	E_2	E_3	C_1	C_2	C_3
OUTER	Charlotte H.S.	Male	8.00	7.00	4.50	8.14	2.43	8.29
		Female	6.14	10.00	3.16	5.28	6.00	11.71
	Marshall H.S.	Male	3.75	9.55	8.50	4.16	8.55	5.75
		Female	8.80	3.14	5.70	3.33	6.12	4.80
INNER	Madison H.S.	Male	5.00	6.00	7.57	7.75	13.00	2.62
		Female	5.71	4.00	11.43	9.33	15.57	2.00
	West H.S.	Male	9.67	12.17	2.00	4.00	8.67	4.78
		Female	9.19	10.00	4.00	3.36	1.87	5.83

On the VEBI-total there were no significant main effects. Again a difference between C_2 and C_3 was evident with higher scores in the inner-city schools associated with the specific movie. The means for VEBI-total appear in Table 3.4; the analysis of variance in Table 3.5.

TABLE 3.5

ANALYSIS OF VARIANCE FOR VEBI-TOTAL SCORES;

MAIN EFFECTS AND SIGNIFICANT INTERACTIONS

Source of Variation	Degrees of Freedom	Sums of Squares	Mean Square	F*
G - Treatments	5	40.29	8.06	1.49
G_1 - ($E_1E_2E_3$ x $C_1C_2C_3$)	1	2.82	2.82	0.52
G_2 - (E_1E_2 x E_3)	1	12.40	12.40	2.29
G_3 - (E_1 x E_2)	1	1.96	1.96	0.36
G_4 - (C_1 x C_2C_3)	1	6.22	6.22	1.15
G_5 - (C_2 x C_3)	1	16.87	16.87	3.12
S - Schools	3	15.07	5.02	0.93
S_1 - (Inner x Outer)	1	3.37	3.37	0.62
S_2 - (Within Inner)	1	8.69	8.69	1.60
S_3 - (Within Outer)	1	3.01	3.01	0.56
X_1 - (Male x Female)	1	0.60	0.60	0.11
G_5 x S_1	1	61.35	61.35	11.33*
Error	15	81.23	5.41	
Total	48	480.01		

* 4.54 is the critical F value at the 0.05 level of significance for 1 and 15 df; 3.29 for 3 and 15 df; and 2.90 for 5 and 15 df.

Appendix D contains tables for mean scores and analysis of variance tests for Sections A, B, C, and D of the VEBI; T-IN 1, and T-IN 2.

Section A of the VEBI asks the student to list the number of people he has talked with in the past two weeks. One main effect resulted from the comparison of E_1E_2 with E_3. Students exposed to the Life-Career Studies scored higher than students presented with the slide-audio version of the Occupational Outlook Handbook. One interaction effect was apparent between sex and the comparison of E_1 with E_2. Girls scored high on E_1 and relatively lower on E_2.

No main effects resulted from the VEBI-Section B analysis, (Have you written, read, watched?), but the interaction of inner and outer-city schools and the C_2 and C_3 comparison was significant. This seemed to be caused by the relatively higher inner-city scores for the specific movie.

Section C of the VEBI asks whether the student has visited or made plans to visit a variety of places. There were two main effects: Scores were higher for the two movie groups than for the students presented with printed materials, and higher in the inner-city schools. An interaction occurred which once again was associated with relatively higher inner-city scores for the specific movie.

The VEBI-Section D contains four questions which ask whether a student has made plans to get a part-time job, take tests, or change school courses. Four main effects were noted as inner-city scores were higher than outer-city, students who saw the specific movie scored higher than students in the general movie group, students who received printed materials did not score as high as the movie groups, and a general treatment effect occurred. Interaction occurred between inner and outer-city schools and the comparison of the two movie groups. Again, inner-city group C_2 (specific movie) scores were relatively high. Interaction between E_1 and E_2 and the two inner-city schools was also evident. Students at Madison in the E_1 group (full Life-Career Study) scored relatively high while at West, scores from the E_2 group (abridged version) were relatively higher.

T-IN 1 was a request for more information form. Four main effects were noted: Females scored higher than males, overall school effects occurred, inner-city students scored higher than outer-city students, and students in the general movie group (C_3) scored higher than students who saw the specific movie. Three interaction effects were also observed.

Three main effects occurred on T-IN 2. It was a form on which a student could request an interview with a worker in a particular occupational field or a visit to a work site. All main effects were attributable to low

scores at Marshall High School; Charlotte scored higher than Marshall, scores in inner-city schools were higher than in outer-city schools, and a general schools effect occurred. Interaction between sexes and the comparison of experimental vs. control groups resulted from very poor responses from boys exposed to experimental materials.

In summary, no evidence of increased vocational exploratory behavior related to exposure to experimental materials was apparent in the preceding analyses.

Results - Vocational Knowledge

A true-false test of knowledge about the field of computer programming was used as the criterion measure for this dependent variable.

No treatment main effects were generated, but students in inner-city schools did not score as high as their counterparts in outer-city schools. Within inner-city schools a difference was apparent; students at Madison did not score as well as students at West. In this analysis no interactions reached the prescribed level of significance.

Again, no evidence was found of differences between experimental and control groups on the dependent variable of vocational knowledge. The T-F mean scores are presented in Table 3.6 and the analysis of variance results in Table 3.7.

TABLE 3.6

MEAN SCORES FOR T-F TEST

OF VOCATIONAL KNOWLEDGE

	Schools		Treatment Conditions					
			E_1	E_2	E_3	C_1	C_2	C_3
OUTER	Charlotte H.S.	Male	65	67	68	68	62	66
		Female	72	70	64	65	59	69
	Marshall H. S.	Male	73	71	80	62	68	70
		Female	56	73	66	69	66	59
INNER	Madison H.S.	Male	64	60	58	60	71	58
		Female	63	56	64	64	60	52
	West H.S.	Male	62	66	66	67	69	59
		Female	76	60	62	70	65	68

TABLE 3.7

ANALYSIS OF VARIANCE FOR T-F TEST

OF VOCATIONAL KNOWLEDGE;

MAIN EFFECTS AND SIGNIFICANT INTERACTIONS

Source of Variation	Degrees of Freedom	Sums of Squares	Mean Square	F*
G - Treatments	5	71.17	14.23	0.46
G_1 - ($E_1E_2E_3$ x $C_1C_2C_3$)	1	27.00	27.00	0.88
G_2 - (E_1E_2 x E_3)	1	0.08	0.08	0.00
G_3 - (E_1 x E_2)	1	4.00	4.00	0.13
G_4 - (C_1 x C_2C_3)	1	17.52	17.52	0.57
G_5 - (C_2 x C_3)	1	22.56	22.56	0.73
S - Schools	3	324.83	108.27	3.53*
S_1 - (Inner x Outer)	1	161.33	161.33	5.24*
S_2 - (Within Inner)	1	150.00	150.00	4.87*
S_3 - (Within Outer)	1	13.50	13.50	0.44
X_1 - (Male x Female)	1	21.33	21.33	0.69
Error	15	462.00	30.80	
Total	48	1446.66		

* 4.54 is the critical F value at the 0.05 level of significance for 1 and 15 df; 3.29 for 3 and 15 df; and 2.90 for 5 and 15 df.

Results - Vocational Maturity

The Attitude Scale of the Vocational Development Inventory (VDI) was the criterion measure for vocational maturity. Difference scores were used after plots of pre against post-test scores showed that the slopes of the lines for the various comparison groups were nearly parallel and approximately equal to 1.00 (Edwards, p. 295).

There were no significant main effects in the analysis of variance of difference scores on the fifty item true-false VDI. The interaction between outer-city schools and the comparison of experimental materials E_1 and E_2 was significant. Students at Marshall exposed to the abridged materials (E_2) tended to score high while students at Charlotte exposed to E_1 showed high scores.

For the dependent variable of vocational maturity, no evidence was presented which indicated any differences between experimental and control groups. Table 3.8 contains the mean difference scores and Table 3.9 presents the analysis of variance of difference scores for the VDI.

TABLE 3.8

MEAN DIFFERENCE SCORES

FOR VOCATIONAL DEVELOPMENT INVENTORY

	Schools		Treatment Conditions E_1	E_2	E_3	C_1	C_2	C_3
OUTER	Charlotte H.S.	Male	0.33	-0.50	-1.75	1.28	-1.14	-0.86
		Female	1.86	0.22	1.17	0.43	0.70	-1.71
	Marshall H.S.	Male	-0.25	1.22	0.00	-1.83	-1.89	-1.37
		Female	-1.00	2.00	0.00	-2.50	-1.87	0.60
INNER	Madison H.S.	Male	-0.33	0.75	-1.43	0.12	-1.33	-0.12
		Female	-2.57	0.28	-0.57	1.67	-1.00	0.00
	West H.S.	Male	-1.67	1.50	0.28	-0.14	-4.00	-0.56
		Female	1.14	0.00	-0.43	0.82	-0.25	0.00

TABLE 3.9

ANALYSIS OF VARIANCE FOR

DIFFERENCE SCORES ON THE VDI;

MAIN EFFECTS AND SIGNIFICANT INTERACTIONS

Source of Variation	Degrees of Freedom	Sums of Squares	Mean Square	F*
G - Treatments	5	17.49	3.50	2.67
G_1 - ($E_1E_2E_3$ x $C_1C_2C_3$)	1	4.81	4.81	3.67
G_2 - (E_1E_2 x E_3)	1	1.48	1.48	1.13
G_3 - (E_1 x E_2)	1	3.96	3.96	3.02
G_4 - (C_1 x C_2C_3)	1	4.38	4.38	3.34
G_5 - (C_2 x C_3)	1	2.85	2.85	2.18
S - Schools	3	2.07	0.69	0.53
S_1 - (Inner x Outer)	1	0.02	0.02	0.02
S_2 - (Within Inner)	1	0.06	0.06	0.05
S_3 - (Within Outer)	1	1.99	1.99	1.52
X_1 - (Male x Female)	1	3.35	3.35	2.55
G_3 x S_3	1	6.02	6.02	4.59*
Error	15	19.69	1.31	
Total	48	75.50		

*4.54 is the critical F value at the 0.05 level of significance for 1 and 15 df; 3.29 for 3 and 15 df; and 2.90 for 5 and 15 df.

TABLE 3.10

MEAN SCORES FOR THE

INACTIVE CONTROL GROUP (C_4)

BY SEX AND SCHOOL

	Schools		N	Criterion Measures VEBI-Tot.	VEBI-Tot. + T-In 2	T-In 2	VDI
OUTER	Charlotte H.S.	Male	6	8.00	8.25	0.33	36.00
		Female	9	9.67	10.00	0.33	35.00
	Marshall H.S.	Male	9	6.55	6.55	0.00	27.11
		Female	7	9.71	10.00	0.28	28.00
INNER	Madison H.S.	Male	7	5.70	5.70	0.00	34.71
		Female	9	6.56	6.67	0.11	33.78
	West H.S.	Male	10	5.80	6.10	0.30	31.70
		Female	7	5.28	5.28	0.00	30.57

Results - Inactive Control Group

Additional analyses were run to compare scores of the inactive control group (C_4) with the active groups. There was no evidence to indicate a difference between treated and non-treated groups. Table 3.10 presents the group C_4 mean scores and table 3.11 contains a summary of analysis of variance results for five criterion scores.

TABLE 3.11

ANALYSIS OF VARIANCE (SUMMARY) OF MAIN EFFECTS FOR THE COMPARISON OF INACTIVE CONTROL GROUP (C_4) WITH THE ACTIVE GROUPS

Source of Variation	Degrees of Freedom	Mean Square	Error Term	F*
Inactive Control Treatments				
VEBI-TOT. Plus T-IN 2	1	21.46	6.68	3.21
VEBI-TOT.	1	21.65	6.58	3.27
T-IN 2	1	0.0039	0.03	0.15
VDI_1	1	0.0887	0.95	0.09
VDI_2	1	0.2893	2.93	0.09

* 4.54 is the critical F value at the 0.05 level of significance for 1,15 df.

Proctor Variability

The results reported thus far have been free of possible proctor effects, that is, they have pooled the results of both proctors for any particular comparison. Several interactions which did occur for some criterion measures were not reported because the effect could have been caused by proctor differences. Analysis, by proctor, of the inactive control group data did not yield significant differences between proctors, but it is not possible to state that both proctors were equally effective with all groups. Undoubtedly some differential effects did occur, however, the major results of this research did not seem to be influenced by proctor differences.

Results - Supplementary Data

Three additional measures were obtained but not used to test the hypothesis in this study. A form was administered during the first session (SRS 1) which asked students how they felt after taking the VDI. Overall attitudes were quite favorable (Appendix D.13) but some school differences did appear. Attitudes were more positive at Madison than West and students at Marshall in the E_1 group scored lower than expected. The low attitude score on the E_1 group at Marshall corresponded with the proctor's description of the group's behavior during treatment.

After the administration of treatments, the students were given a form (SRS 2) with three questions: A - How interested were you in the materials, B - What did you think of the materials, and C - How much have the materials made you want to get more information about careers? The analysis for SRS 2A (Appendix D.16) indicates a difference between the specific and general movie groups. The general movie was rated to be of greater interest.

The second question, SRS 2B, showed the same higher rating of the general movie and, in addition, showed a difference between experimental and control materials, favoring the control materials. This difference appears to be associated with the very favorable ratings by the general movie group.

SRS 2C asked students how much the materials had made them want to get more information. Only the difference between inner and outer-city schools was significant, with the inner-city students scoring higher.

The third instrument administered to treatment groups was the Job Interests List (JIL). An analysis of difference scores was carried out for two scales; the number of computer-related jobs mentioned and the level of the first two jobs listed. No differences were found among the main effect comparisons. Means and analysis of variance results appear in Appendix D.21 - D.24.

Summary of Results

No results were found which indicated differences between the experimental and control groups on any dependent variable; the null hypothesis could not be rejected for vocational exploratory behavior, vocational knowledge, or vocational maturity.

While this study was undertaken primarily to develop and evaluate new experimental materials (Life-Career Studies), and these results have not been significant, the overall findings raise some questions with implications for further research. Some of these will be discussed further in Chapter IV.

Discussion

Scores on the VEBI were higher and more variable than expected. Previous research produced means which rarely exceeded 5 activities, while in the present investigation, means ranged up to 15 reported activities. Two explanations may partially account for this difference.

The administration of the VEBI in this study was quite hurried, and adequate controls did not always exist. The proctors reported, however, that group responses during this session were positive and helpful. Supportive data for each reported student activity was not always obtained, however, all students who reported any

activities had at least one supportive sheet on file. Previous research may be more accurate because of the rigorous use of the VEBI, but it is also possible that students in those investigations failed to report incidental information seeking activities. Experience with handing a student a thick booklet (VEBI) in the present study, often indicated that students were not initially pleased with the task they faced. Student attitudes at the time of VEBI administration may be an extremely important variable and may account for the relatively wide range of activities reported in the present investigation. In previous research no activities reported by students have been found to be incorrect or untrue.

Another limitation concerning the VEBI scores deals with interpretations made from the subsection analyses. Section A contained 8 questions, Section B had 5, Section C had 4, and Section D had 4. In addition, the frequency of responses on Sections C and D was often low, and therefore cautious use should be made of the VEBI subsection analyses.

One somewhat curious result concerns the comparison of the two movies used in control group C_2 (specific movie) and C_3 (general movie). Evidence of significant differences was presented in five separate analyses

between these two groups. The above mentioned VEBI-section D indicated main effect differences favoring the specific movie, and interactions in Sections B and C also seemed to be related to the relatively more positive responses of inner-city students to the specific movie. However, other results, including T-IN 1 differences favored the general movie. Two student response questions indicated that the general movie was more interesting than the specific movie and that students felt it was better. The evidence somewhat favors the general movie, but the relatively stronger reaction by inner-city students to the specific movie cannot be disregarded.

School main effect differences were also apparent in five analyses. Inner-city students turned in more requests for career information (T-IN 1) and more requests to meet a worker (T-IN 2) than outer-city students. They also said the treatment materials encouraged them to get more information (SRS 2C), and they made more plans to visit work sites than outer-city students. Inner-city students scored lower on the T-F test of occupational knowledge, and within the inner-city schools, Madison scored significantly lower than West. Inner-city students, according to proctor reports, were clearly eager to obtain more information related to their career development.

The question of what constitutes an inner-city school is of some concern in this investigation. In the above true-false test the students at West scored more

like the outer-city students, while scores at Madison were clearly lower than all other schools. West was selected as an inner-city school because it is commonly regarded as such in Rochester. In actuality, it is a school in transition and turmoil, and the apparent perceptions of it may be more a product of the change than of its absolute characteristics. It remains, however, that in Rochester, West is considered to be an inner-city school. Whether the results of this study can be applied to an inner-city classification in another location is questionable.

The differences between boys and girls in this study were minimal. Only on T-IN 1 was a main effect noted as girls scored higher. Several interactions occurred but, in general, boys responded as well as girls in this study. This was a pleasant surprise, especially on measures such as the true-false test, attitudes after taking the VDI (SRS 1), and self reported activities (VEBI).

It was disappointing that differences were not noted between the inactive and active treatment groups. It has been mentioned previously that VEBI scores were higher than expected in this investigation, and the inactive control groups were not exceptions. Their scores ranged from 5 to 10 self-reported activities. Beyond the question of VEBI reliability, it is impossible to assess the degree to which the inactive control group students may have been stimulated by observing the involvement of

of the active students. Since approximately half of the ninth graders at each school participated in the active groups, it is possible that differences among all treatments may have been obscured because of student interaction between group sessions.

It was also disappointing that differences among treatments were not, in general, at a significant level. How much can be expected as a result of 47 minutes of treatment, is another question.

CHAPTER IV

SUMMARY, CONCLUSIONS, AND IMPLICATIONS

"Effective, research-evaluated media designed to supplement individual and group procedures in educational and vocational counseling are virtually non-existent." (G. Brian Jones, p. 119)

Summary

The present investigation was undertaken to develop and evaluate new occupational materials called Life-Career Studies. The need for new materials, to overcome the limitations of printed media and to present more information than "job facts," led to the Life-Career approach. For this study the occupation of computer programmer was presented in slide-audio form through the lives of three people, Al DeLucia, Sam White, and Mrs. Ann Naymik.

The audio portion included segments of the role model's own voice and, in addition, was pulsed to control the slide changes.

Because at least three people represented each job, a variety of working conditions, places of employment,

and psychological satisfactions and dissatisfactions were described. Each person's story was depicted as follows:

- Identity - An attempt was made to make this person "real." His name was given, picture shown, occupational title and place of employment stated and shown, and his voice was used.

- Job Situation - Physical, social, mental aspects of a job were presented. Typical arrival routines, relations with boss, peers, kinds of decisions encountered, leaving routines, etc. were described with emphasis on personal satisfactions and dissatisfactions.

- Life Style - Off-the-job activities included education, sports, etc. Family, home, neighborhood, method of transportation, relatives, patterns of socializing were included.

- History - The present job was seen as part of career development. This section included educational, job and personal-social history. Emphasis was on the reasons why a person made the choices he did and his feelings about them.

- Future - Aspirations for self and family were described. Particular attention was given to immediate and long range career planning.

Three such presentations allowed each module to differ in what was presented. For instance, different life styles were shown; different ways of attaining similar positions were identified; a minority group was represented in a career; and a female model was provided.

The modular design of Life-Career Studies was formulated by the writer to be appropriate for the development of a multi-media data base of career materials.

Each module could be indexed and retrieved to serve an endless array of uses.

In this study three versions of newly developed materials were experimentally compared to three existing occupational information treatments. The experimental materials were a full Life-Career Study (E_1), an abridged version showing the three workers only on the job (E_2), and a slide-audio version of the Occupational Outlook Handbook (E_3) which used slides selected from E_2. Control treatments used a booklet of printed occupational briefs (C_1), a 16 mm movie on programming (C_2), and a 16 mm general career movie (C_3). An additional control group (C_4) was not exposed to pre-testing or treatments. The experiment was replicated with male and female ninth graders in four high schools (two representing an inner-city climate, two outer-city) in the City School District of Rochester, New York. 391 students were involved in the total 7 x 4 x 2 factorial design. Three sessions were held with randomly selected groups of not more than twenty-four students. The first session was for pre-testing, the second for treatment administration, and the third for post-testing. Five independent 2 x 2 x 2 analyses were performed on sixteen separate scores to test the research hypothesis that:

> Ninth grade students presented with the experimental materials will score higher in vocational exploratory behavior, vocational maturity, and vocational knowledge than equivalent students

exposed to control conditions C_1, C_2, and C_3.

The psychological concepts of exploration, curiosity, and vocational maturity provided the basis for operational definitions of the criterion measures. The work of Jordaan, Berlyne, and Crites was instrumental in the theoretical organization of this study while the experimental work of John Krumboltz and G. Brian Jones was influential in the procedural design. Alan Bells' research on role modelship provided support for the Life-Career concept.

The criterion instruments used for the dependent variable of vocational exploratory behavior were the Vocational Exploratory Behavior Inventory (VEBI) and two separate request for more information turn-in forms. Vocational knowledge was assessed by scores on a true-false test of knowledge about programming, and vocational maturity by difference scores on the Vocational Development Inventory (VDI).

Other measures were obtained to provide supplemental information. Students' job interests, attitudes after the first session, and their opinions about the treatment materials were obtained on various response forms.

Conclusions

The research in this study was undertaken to discover whether newly developed career guidance materials were more effective than existing materials in stimulating vocational exploration, increasing vocational knowledge, and in increasing vocational maturity. This goal was not upheld; it cannot be concluded that any one of the six treatments was more effective than any other.

It had been expected that girls would score higher than boys on all measures. This was true, however, on only one of sixteen criterion scores. This was a pleasant surprise as was the response of the inner-city students. Higher scores had been predicted for outer-city students but this was true on only one of five significant main effects for schools. Inner-city students turned in more requests for career information, and, in general, responded eagerly to the opportunities presented to them.

This study was designed for replication in two inner and two outer-city schools. The assumption was made that variability is sometimes extremely great from school to school regardless of the socio-economic climate in which the building is located. Some evidence was presented to substantiate this assumption, e.g., low T-F scores at Madison and low attitude scores (SRS 1) at Marshall, but not enough to be confident of it. Further

research is needed, and until it is provided, studies which use only one school to represent a particular climate should be generalized with extreme caution.

It had been predicted that proctor differences would not occur and this assumption was not disproved. However, on some criterion scores, significant interactions could have been related to differences in proctor effects. Further research should carefully control proctor variability.

Some evidence occurred which may indicate a differential effect of certain materials in inner and outer-city schools. Specifically, the general movie was rated more interesting than the specific movie, but inner-city students in the specific movie group, showed higher scores on most criterion measures. It is possible that something in the C_2 treatment excited inner-city students more or that something in the C_3 treatment suppressed their responses. It seems reasonable to say that career guidance activities and materials should be developed and evaluated in the context of the specific populations to be served.

Implications for Further Research

Research in the behavioral sciences, especially in school settings, will always need to deal with uncontrolled or partially controlled variables. The present study started out as an attempt to account for

many factors, but as the experimental research progressed it became clear that human responses were influenced by many variables which we were not prepared to evaluate. Future studies should be cautiously designed to record the unexpected and seemingly unexplained. Closer observation of individuals under experimental conditions is needed.

1. The career guidance materials which were studied were not designed primarily for use with groups of students. Future research should evaluate the effectiveness of Life-Career Studies with individuals who request career information. While such research presents many additional methodological problems, it is clearly needed for the effective evaluation of new materials such as Life-Career Studies.

2. The present study attempted to account for within-school variability by using two inner and two outer-city schools, but many questions have been left unasked. Future research should pay closer attention to student attitudes toward school, group-proctor reactions, and other factors involved in group climate during treatment administration and testing.

3. The present study dealt only with ninth grade students. The materials appear to be appropriate for students ranging from upper elementary school through high school to adults. Evaluation should be carried out

with a range of age groupings and population types.

4. In future research greater care should be taken to account for the level of sensory stimulation. Factors such as sound levels, color saturation, amount of music, equipment noise, timing of script presentation, room and light levels, need to be held more nearly constant across treatment groups. This is especially difficult when different media are used in the various treatments.

5. The specific materials evaluated in the present investigation dealt with only one occupation, computer programmer. Additional occupations should be developed and evaluated before sound conclusions can be reached regarding the Life-Career Studies concept.

6. The future development of materials like Life-Career Studies should incorporate "involving" activities such as simulation and problem-solving. The work at Stanford of Krumboltz, his colleagues and students, offers a great deal of promise in motivating young people to explore the career worlds around them. Young people must move toward exercising increased conscious control over the paths which their lives travel.

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APPENDICES

APPENDIX A

Treatment Materials

Appendix A.1

Script for Full Version
Life Career Studies, E_1

Appendix A.2

Booklet of Career Briefs, C_1

Appendix A.3

List of Suggestions

Life Career Studies on COMPUTER PROGRAMMERS

(Illustrated Script)

by

David B. Youst

The Rochester Career Guidance Project

Al DeLucia - Lincoln Rochester Bank

Sam White - Xerox Corp.

Ann Naymik - University of Rochester

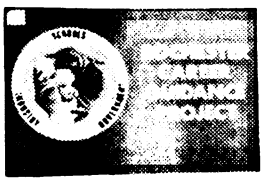
City School District

13 Fitzhugh Street South

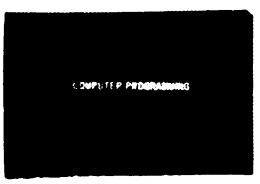
Rochester, New York 14614

Life Career Studies on COMPUTER PROGRAMMERS

by David Youst



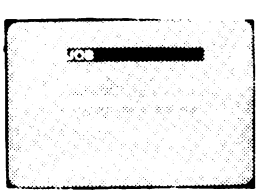
The Rochester Career Guidance Project presents life career studies for Computer Programmer. You are about to meet three people who work as computer programmers.



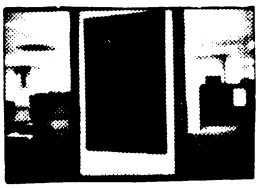
Al DeLucia, "When they hire you as a programmer they start you off in programmed material - programmed books from IBM."

Sam White, "I'm no math genius, far from it. I haven't had much math. All a computer can really do is add."

and Ann Naymik, "When you write a program you can't be sloppy. You must be very precise, very organized, and this is why I think women adapt to this very well."



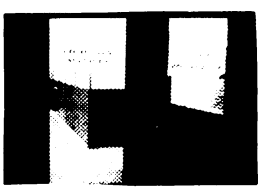
You will see each person on the job, at home. You will find out how they became programmers and what they look forward to in the future.



Al DeLucia is a computer programmer for the Lincoln Rochester Bank at 183 East Main St. in downtown Rochester. He is 32 and has been in this job a little more than one year. During much of this time he has been considered a trainee.

Ordinary working hours are 8:30 to 5, with an hour for lunch, but Al has worked many evening hours during the past few months - around 60 hours a week. Everything over 37 hours is paid at 1½ times his regular salary.

Usually he takes the bus downtown to work, stops for a cup of coffee at the White Tower, and then arrives at the bank early, about 8:10.



Al's desk is located on the 9th floor in the Programming and Systems Department. Much of his time is spent there. But the computers and key punch sections are located on the 4th floor and Al frequently takes the elevator down when he leaves a program to be tried. Sometimes - not often - he runs the machines himself. In fact, on his present assignment, the Quinby Project, much effort is being spent in training the computer operators in how to use the system.

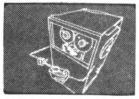
So, training and "debugging" take place at the same time. (Debugging is making sure the machines are told the right things to do by a program) - that everything works the way it should.

Because Al is part of a five man team which is developing a new system for the Quinby Co., his day usually starts by getting a progress report on his project. Each night some work is done on the computers when some computer time is available. The computers work around the clock and so, therefore, do some of the employees. Only a year ago Lincoln Rochester employed 10 programmers. Today there are 20, including Al and his fellow project members. The basic part of Al's job is telling a machine - a computer - exactly what to do. This is called writing a program.

"The computer, not knowing what you are doing, will do anything you tell it to do. If you say punch before you move, it will punch before you move. It has no ideas - referred to as the beast. It has no brain. You are its brain. You are the person who is leading it by the hand

through series of instructions that in your mind are logical. In the year I've been here I've never seen anybody write a program that has been put on the computer and run the first time."

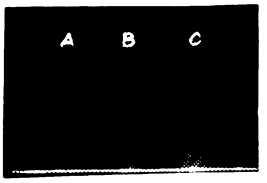
That part of a programmer's job which involves writing out each instruction for the machine is usually called coding. Al spends between 1/4 and 1/2 of his time at his desk writing these instructions. He has to be very precise and many steps or actions are involved.

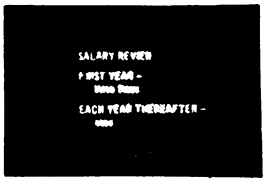


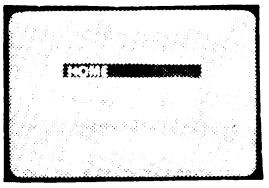
Imagine a child being told by a parent, "Now eat your cereal." Pretend the child is a machine and think what he would need to be told: You know - pick up a spoon - dip it in the cereal - lift it to your mouth - swallow the cereal.

Well, that doesn't sound too bad, but if he really were a machine he would need to be told: what a spoon is - what to pick it up with - how high to pick it up - how to hold it level - how far to move it (over the bowl) - how far down to dip it - how to tilt the spoon - how to level it out - how to lift it - how far to move it (to the mouth) - and that's only part of it. Al wrote a program pretending that a machine was told, "Eat your cereal." It took more than 30 separate commands or actions. The part of a programmer's job

which involves actually writing out each command in "machine" language is called coding. Of course, before any coding takes place, a plan or systematic flow diagram, has to be developed.







The rest of Al's work time is spent in talking with others about future jobs, about what output, or final product, a customer needs (what job they will want done), in debugging, or finding out why a program doesn't run quite right, and in education. As high as 20% of a programmer's time can be spent in learning about new procedures, applications, and equipment.

Al meets frequently with his boss, Mr. Accorso, Manager of the Programming Department. In addition, regular meetings are held in regard to the Quinby Project.

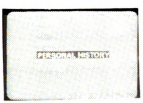
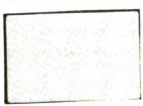
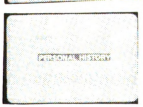
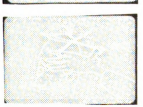
Lincoln Rochester has three salary levels for computer programmers and it is possible to earn more than $13,000 a year.

Al's base salary is near $8,000 but that doesn't include overtime. His salary is reviewed three times during the first year and once a year after that. In the past year he has received raises of $1,000.




Al and Susan DeLucia have been married just over a year. They live on the second floor of a two-family home near Jefferson High School in the city. Relatives and friends live nearby. Susan teaches school in Greece and drives the family car to work there. They both enjoy reading and Al has refinished several pieces of their own furniture. They are constantly looking for old pieces that he can remake. Traveling and music are also very important to them.

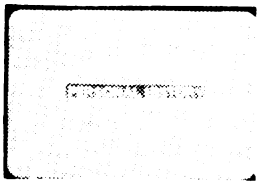
But Al's first career was that of barber. After graduating from Jefferson High School he volunteered for active military service. After two years active duty, Al spent six years in active reserves.

"I got out of the service and, being my father's oldest son, I have two older sisters, I was kind of a disappointment to him because he aspired for us to go to college, or at least the boys. My father was born in Italy and he wanted for us what he didn't get himself. At the end of high school, I felt that I don't need college. I got out of the service and I was still faced with the same thing I was faced with before I went in the service."

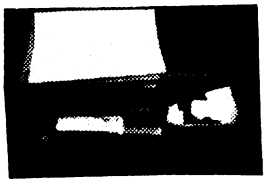
"So a friend of mine and myself, a high school and life long friend, - he was going to go to barber school and he asked me to drive him down and I did.

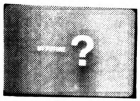
I decided, well, as long as I'm not going to go to college, - I said, gee this doesn't look too bad. I was 20½ when I got out of service. I went to a barber school here in the state, paid by the government, and I did in fact serve an apprenticeship, work for a master barber, and I did open up my own business. Eventually, I did own my own shop."



At age 24, Al grossed more than $10,000 in his own shop but started thinking seriously about his future. "I was talking to a man named Norm Morielli. He said, 'What are you doing?' We got to talking and I said, 'Gee, I'm disgusted. I'm not going anywhere. Look how young I am. Look what I've got and I can't get anywhere with it. I'll forever waltz with this barber chair, and I can't see doing it until I'm 65'."

Soon Al began studying at Monroe Community College. He barbered part time to pay his way through. After two years he transferred to the New York State University College at Cortland. Al spent two and a half years there and received his BS degree with a major in mathematics and was certified to teach. Since teaching jobs were not readily available that January in Rochester, Al considered other lines of work and settled on programming. The future is constantly being re-appraised.





"I would eventually hope to get into - maybe - the systems end of this field, or possibly in the far future - into some sort of managerial operation."

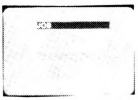
"Personally, like I say, I may not be here at the bank. I can't see leaving here in the near future. When I say near future, I mean the next three years."

"I have no idea what management thinks of me or what management has in mind for me. I know I was hired as a programmer when I was interviewed and this is what I am doing. That's part of the bargain. Like I say, I hope to step up. I think everybody does. I don't think there is anyone satisfied to stand still and this I don't want to do. I don't want to stand still. By the same token, I don't think this will take place in the next three years. I don't expect it to take place in the next three years."

SAM WHITE

COMPUTER PROGRAMMER

XEROX



For almost two years Sam White has been a computer programmer for the Xerox Corporation in Rochester. Much of his time was spent downtown but now he works almost full time at the Xerox Webster Manufacturing Center, Building 207.

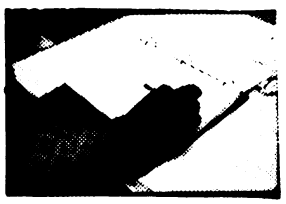
Sam estimates that Xerox employs 60 to 70 programmers in three different centers, Research in Henrietta, Business at Midtown, and Manufacturing in Webster.

Sam White is assigned to a project which has responsibility for keeping track of all the parts used to make a Xerox copy machine. The Project is called IIMF for Item Information Master File. IIMF is really many programs which work together and ordinarily, using this program, computers keep track of what kinds of parts are in storage bins, what their numbers are, how much they cost, how you make them, who sells them and many, many other things. Ordinarily this program is used many times a day by many departments. Sometimes changes need to be made in one of these programs. For instance, someone in the engineering department might want some information that he hadn't needed before.

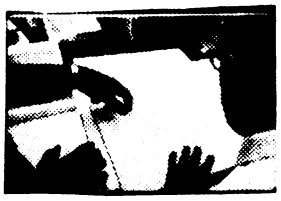
Sam's job, then, is to write a series of changes into the existing programs. More than 1/4 of his time is spent in actual coding - specifically, in detail, writing instructions which the computer will understand.

In addition, he constantly is faced with the problem of finding out what happened or what went wrong when the computer programs don't work the way they should.

"What you do is - well - you have to prove something to yourself in the first place. It's like a game you play. You are really in competition with this machine - even though it's dead and it's an object - it's nothing. (Once you get the program inside and it's working at fantastic speeds, things can get away so fast.) When you have a bug that's very had to find, sometimes you feel like taking a ... and you think the machine is playing tricks on you."



"You keep going - early I'd say, in my life as a programmer, I'd say many times it almost beat me, but each time you solve a problem - pretty soon you build up this confidence and when you get to this problem, it never bothers you any more because you know ultimately you'll beat it."

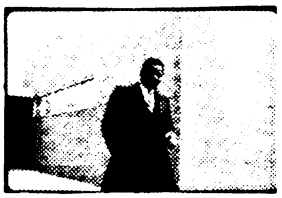


When some changes are made in a program and then the computer doesn't do what it should, they say it "blew up" or "bombed." When the machine gets "confused" - when it can't perform the operation it is told, it stops operating on the program, and prints out everything it "knows" or has stored inside it. This is called a "core dump." These sheets of print-out usually contain the key to the problem and Sam has spent hours at a time looking over these sheets.

There are many things which can cause a "blow up." When a program is first written or after a programmer writes changes on an existing program, this information is usally put on "IBM" cards by punching holes in them on a key punch machine. These cards may then be used to revise or change information on tapes or disks which computers use for their "memories."

Errors can occur during these steps as well as in the information which a programmer changes. This part of the job is really trouble shooting.

Sam talks with many people during a typical day - if these is such a thing - but much work is done alone at his desk. His day starts at 8:00 and lasts until 5:00 with an hour for lunch. He works with a Project Leader, who is a Systems Analyst, and a Coordinator. The Coordinator controls the flow of work so that one project does not become swamped with work. Meetings are held every other week.

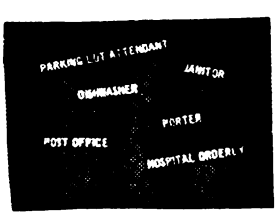


Today, at age 30, Sam's base salary is in the $11,000 range. Overtime work is performed when trouble may effect the production of machines.

It usually takes Sam 25 minutes to get to his home near Clinton and Ridge Road. Life is not inactive with six children - David, Deeann, Sam, Cherise, Renee and Van - and two nights a week taking courses at Monroe Community College. His wife, Ann, is a key punch operator for Xerox and they share many home responsibilities, such as grocery shopping, and cleaning. Sam's time is spent enjoying the kids, listening to music, studying for the college courses he takes and he is also active in his PTA and serves as treasurer for it.

Sam has been blind in one eye since he was two and when he graduated from high school in Flint, Michigan, he could not get a job with General Motors where his father worked. He became a porter in a clothing store but soon moved to Rochester,the home of his wife-to-be. He was a hospital orderly, parking lot attendant, dishwasher, janitor - and usually worked two jobs at the same time.

"My father-in-law happened to be one of the oldest employees, mail handler, in the Post Office. He talked me into trying to take a test for the Post Office. I said, well, I'd give it a try. They really forced me to take this test. I took the test and after a couple of attempts, passed it."



Sam White spent more than eight years with the Post Office. The most he ever made was $6,600 a year and during his last two years there he attended Rochester Business Institute where he studied data processing.

"I remember I was working at the Post Office, anyway, and I began to think - well maybe I could be something else. I didn't like the Post Office. When I first started working I really loved the job. But then they didn't allow me to think and I was doing quite a bit of that, at that time. I was trying to make my own decisions - thinking about things - everything that I came in contact with. I wanted to make sense and it seems that at that particular Post Office nothing made sense. So I decided, maybe I'll go to school ...".

"Three nights a week for three hours a night. That was a hard decision to make because it cost about $1,800 with a growing family. We really didn't think that I would get a job, but we decided that we'd do it."

After RBI, Sam's first job was computer machine operator at Kodak. He stayed less than a year before moving to Itek where he became an operations supervisor. After a year and a half he got a chance to become a programmer at Xerox where his advancement has been steady. As he has learned and as he has done the job.

"This has done a lot to show me I'm worthy. I got a promotion not long ago which I know wasn't given to me.

It's a constant battle with yourself, with the outside world, and I don't know, something always told me, I'm not good enough. The outside world told me that I'm not good enough but you can't listen either. You have to just - I don't know. Also, I've got a nice wife that won't let me quit. Lots of times I wanted to quit. She picks me up when I go down."

For Sam White the future holds many possibilities, many of them unclear at this time.

"I might want to be a manager sometimes. I really like accounting though. I've heard about accountants - if they're data processing oriented, they are the executives of tomorrow."

"I don't particularly want to lead people. It's just not clearly defined yet what I want to do. I want to be the best at what I do. I've been told that this is a fault. My kids don't like it so much. What I want to be for myself, to prove to myself - that I can do it - and make other people liars if that's a good motive. I want to be the best in this business and if you are good in this business there's no telling where you'll end up."

ANN NAYMIK

COMPUTER PROGRAMMER

UNIVERSITY OF ROCHESTER

A computer programmer at the University of Rochester computing center, Ann Naymik has been in her present position for five years. The center is located at Mt. Hope and Elmwood Avenues in a section of Towne House Motel and is designed to serve faculty, students, and University administration as they work on special projects. Business computing such as payroll, is done at another University data processing center.

Ann's day usually begins at 8:30 and lasts until 4:30 with an hour for lunch. Facilities are unusually fine. Each programmer - and there are eight at this center - has his own large office. Ann rarely works overtime.

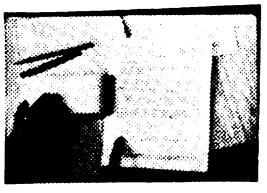
The center is a service division of the University and this means that much of the work the staff does is helping other people with their problems. This is called consulting. Each day the center has someone on consulting duty for the whole day to help anyone who comes in. But, in addition, many people call on Ann for help because they have worked with her before. A consultant may help someone pick out the best program or programs to solve his problem in addition to helping out when a program "bombs" or "dumps." This sort

of trouble-shooting involves reviewing each step in the process to find out what went wrong. One student came to Ann because the program he tried did not work on the computer. A "core dump," the original cards, and the student were available to Ann to help her find out why. In this case it turned out that the student was expecting too much from the program. He was asking it to take care of 58 items of information but it had places for only 52.

Ann also spends about 1/4 to 1/3 of her time in writing special programs which have been requested by various people at the University. This is the heart of a programmer's job.

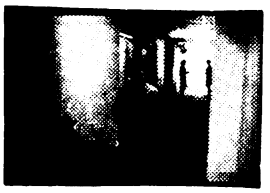
1. Getting a detailed understanding of what must be done by the machine. This may mean talking to the person who asked for this program.

2. Developing a flow chart of actions to be taken by the computer and tracing the things which might happen.



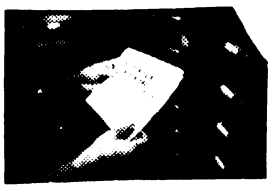
3. Changing the flow chart into specific instructions - written in a language the machine can understand - like fortran, PL1 COBOL, or many others. This step is really called the coding operation.

4. Trying the program out. Almost always corrections must be made. This is called debugging.

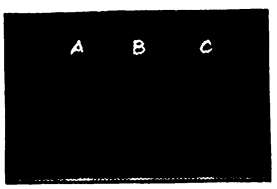


Ann has two other special jobs. One is overseeing the library of stored programs. Because many programs can be used over and over again they have to be stored, used, and returned in a way which everyone understands. Between 100 and 150 programs are kept in this special library. Ann Naymik also has responsibility for accounting for computer time. Expense is calculated by the number of minutes the computer took to do a certain job.

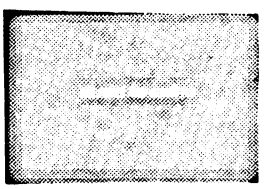
"Our users have account numbers and these numbers are chargeable by certain rates depending on the type of service they use. Each month a bill is sent to them and on this bill shows how much they have spent for the various services they have used. This program is one that I wrote and that I keep up to date and sort of watch over."



Ann's work load is balanced out by the center director's handling of new understakings and by Ann's own decisions on how to spend her time. She usually talks to Dr. Swoyer, the Director, almost every day.



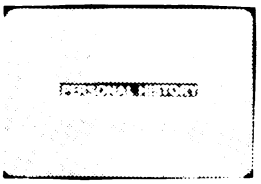
At this University center salaries for programmers range from $6,500 to more than $10,000. Ann receives a salary near the upper end of this range. Her vacation period is twenty working days or one month a year besides the usual holidays. She has recently been named a senior programmer and this entitles her to other special benefits such as the University faculty retirement plan.



At home, Ann enjoys many activities, among them sewing, painting, cooking and reading.

"Right now I am reading the 'Sane Society' by Eric From and I find it's a good way to put me to sleep. So I don't get very much out of it. You'd be surprised how much there is in manuals and oh, the usual women's magazines. I'll pick up a manual because it's especially interesting but it's absolutely useless because there's so much to learn. Also, I have the problem - my husband is also involved in computers. Of ten we have a rousing argument at breakfast about computers. In a way it's nice and in a way it's so hard to get away from it. We talk about it a lot."

"The pressures of taking care of a home are never simple. I guess the other thing is that as a woman who works full time, when you go home you have another full time job. I think that's most aggravating at times. The pressures of the day aren't ended. When you leave the office and go on home instead of thinking about what I did or thinking about it I'm worrying about whether I picked the meat out of the freezer this morning or what my day is. I'm out of bread - or you know -. You get home and right away you have to control yourself."



Ann graduated from the University of Michigan in 1943 with a major in liberal arts and a minor in the Russian language.

"On this basis I went to work in Washington for OSS in the Far East division. This was during the war. I was involved in gathering background information for a report on the Far East.

Then I got married and my husband went overseas - and I taught school; the sixth grade." ... "just a year. My husband came back from the war and we went back to Michigan for him to get his disgree."

"In Michigan I worked as a mimeograph operator in the University's Publication Service - for a year. Just running the mimeograph machine because there wasn't any other job available. Then I started as a typist clerk in the Academic Counselor's office. Then became a secretary while there. Then moved over to become secretary to the Chairman of the Psychology Department in Michigan. I was secretary for about seven years,I guess."

Next Ann and Dan moved to New Jersey where they worked at Bel Lab. He in the Physics division and she as an executive secretary. But this secretary's job wasn't satisfying.

"A secretary's job is very dependent on the relationship she has with the man she's working for. It has to be a very close relationship in order for a secretary to be a truly effective person. Sometimes

if there is a problem with personalities - then no matter how good the job situation - you may decide that it isn't going to work out. I just couldn't live that way in that role. I wanted to stay on for many reasons. It was a good company. But being a secretary was impossible. No matter who I worked for I would still be living in a structured role and I fought it terribly."

"I went into the personnel office. I was very fortunate at the time that I decided at the time that I wanted to change my occupation. The laboratories had just decided that they could train two non-technical people to be programming consultants. They thought there was a need for someone who didn't have to have a scientific background but could learn all the rules that a particular computing center have and help people. So they sent me to IBM to school."

The future for Dan and Ann Naymik involves both of their jobs.

"Our coming here to Rochester had nothing to do with whether I could get a job, but my husband feels that any changes that he makes in the future will definitely also have to involve me. He would not accept a job where I could not find a satisfactory position also - because he feels it is very important to me to have a career. So he feels any changes he would make in his jobs would all have to mean I could make a comparable move also."

Computer programmers work in many other Rochester businesses, industries, and institutions.

If Al, Sam, or Ann were a high school student now and wanted to prepare for work in the computer field as a programmer, he or she would probably paln to attend four years of college. Two year schools like Monroe Community College would be considered as would other one or two year schools.

In high school, academic English and History would be backed up with lots of Math and Science. Other possible electives include Data Processing, other business courses, and courses necessary to enter college.

If what you have seen has interested you, how is the time to act and get more information.

ROCHESTER CAREER GUIDANCE PROJECT

CAREER BRIEFS FOR COMPUTER PROGRAMER

1. Chronicle Brief 175
2. SRA - Work Brief
3. Occupational Outlook Handbook p. 219

PROGRAMER

(2d ed. D.O.T. 0-69.98) (3d ed. D.O.T. 020.188)

The data processing programmer supplies the ement of intelligence to the electronic computer. s instructions, "the program" provide the di- ctions which enable the computer to perform a ven task.

This occupation was not even envisioned 20 ars ago, yet today it is one of the fastest grow- g in the country. The electronic computer is just ginning to find its place in our economy. Its po- ntial market is very great at present, and every y more uses are being found for it. Work as a ogrammer offers an opportunity for a satisfy- g career with an excellent outlook for the future.

History

The history of the occupation of programmer rallels that of the electronic computer. The ectronic computer was developed during World ar II as an aid in solving intricate scientific and gineering problems such as gunfire control. Its efulness in a wide variety of other circum- ances was quickly recognized. After the war, e electronic computer emerged as our most werful tool to reduce clerical costs, maintain rrent and accurate records, solve highly com- ex engineering and research problems, and pro- de timely information for management decision- aking. In 1951, the Federal Government received computer for use in the Bureau of the Census r the 1950 Census of Population. The first com- uter for a business firm was installed in 1954.

This was followed by a phenomenal upsurge in mputer installations. At present, there are more an 17,000 computers in use in a wide range of usinesses and in government agencies throughout ie world. About 14,000 of these computers are in ie United States and of these more than 1700 are eing used by the Federal Government alone.

"Programs" for the computers were first pre- ared by engineers and mathematicians associated ith the development and construction of the ma- hines. Gradually these men were replaced by en- ineers and mathematicians specializing in pro- ramming. A considerable part of the work at this me was to understand the computers' abilities in rder to improve and modify the machines. The

Photo by H. Armstrong Roberts

early machines were primarily built to solve mathematical problems for scientific research.

When the machines were adapted to commercial purposes, primarily for the purpose of reducing clerical work, a body of knowledge about the machines was already in existence. As a result, programming frequently became a fairly routine job. Firms found that non-engineers could handle much of the programming. Organizations engaged in scientific research found that the programmer's work could be graded and that an engineer or mathematician could team up with non-scientist programmers to carry on a successful operation.

Electronic Computers

The electronic digital computer is one of the great inventions of our time. It is one of the group

electronic mechanisms that undoubtedly will e a revolutionary effect on our lives by ad- cing science and minimizing the routine de- ed aspects of some work.

Digital computers can perform the most com- cated mathematical calculations in phenom- lly short time, for example, some can add two ge numbers in as little as a one millionth of a ond. A mathematical problem requiring mil- ns of calculations can be done by an electronic nputer in a few minutes.

Computers can perform other functions such making comparisons, bringing together certain es of data and choosing between alternatives. ey store information and bring it out when need- Some large computers can execute 100 erent operations.

However, computers cannot think. They must given careful, detailed instructions in a very nple form. Basically, the machines operate on es or no system. They do everything by making hoice from two possibilities. The instructions , therefore, broken down into a series of very all steps to permit such simple choices.

Most computers are the central unit of a com- er system. Auxiliary equipment is attached to o increase its ability and to use its great com- ational speed. Among these are machines that pare the data for the computer and printers t print the computers' solutions.

The system is controlled by a control console unch keyboard). Data is entered into the com- er from punched cards, punched paper tape, ewriters, magnetic tape, high speed magnetic ms and discs. The larger computers often have combination of these devices whereas the aller ones generally rely upon one or at most, types. The large units use magnetic tape.

The computer's amazing ability is a long step ward in man's effort to understand and control forces of nature. It provides scientists and ineers with a tool to solve problems that could be handled before because of the time it took carry out some of the calculations. It is even stimulus for mathematicians to develop new es of mathematics in which such calculating lity is an accepted condition.

In business, the computer provides the means reduce the ever-growing large volumes of rical paperwork and the immense amounts of e and manpower spent on routine clerical work the office and factory. It is also beginning to ve a powerful tool for implementing compre- sive management information systems that in- rate the data flow between different functions business and provide management with faster, re accurate and more meaningful information business decision-making than could be ieved through traditional clerical methods.

The Programmer's Job

The programmer plans and organizes the man- ner in which the computer will operate to carry out a given job. Usually the work is grouped into four steps. The first is to analyze the problem. Is it a problem that can be handled by the computer? If it is, what will be the general method of using the computer? This is followed by the second step, preparing a flow chart which expresses the machine operations in general terms. The third step is to refine the flow chart into completely detailed machine operations. Every machine step necessary to carry out the whole project is written out and translated into code, the machine language. This is the machine's instructions. Finally, the instructions are tested on the machine and the necessary changes are made if errors show up.

Programmers work closely with systems analysts to define problems, analyze the input data and output report requirements, and prepare a program of instructions which the computer can follow to solve the problems. The highly abstract nature of systems and programming work requires strong logical and creative abilities.

In planning to use an electronic computer to do clerical work, to understand the kinds of reports needed and their timing, the programmer must have discussions with company personnel at all levels. When all the information is assembled, the programmer prepares a flow chart showing the logical order in which various operations must be performed by the machines. He then writes the many hundreds -- sometimes thousands -- of program instructions. The final instructions are coded into special machine language which is converted into holes on punched cards and paper tapes or marks on magnetic tapes.

Programmers engaged in solving scientific or engineering problems also perform analytical work, prepare flow charts, write instructions, and test their programs. In this work, however, the programmer deals chiefly with scientists and mathematicians who present the problem in complicated mathematical formulas which the programmer has to simplify into arithmetic forms the computer can handle.

In offices with large computing systems, several programmers at different levels of responsibility may work as a team on one problem. A senior programmer may have responsibility for the entire program and may direct other programmers. Beginning or junior programmers are usually assigned to write specific parts of broad programs.

Working Conditions

The programmer usually works in a well-lighted, air-conditioned office. No particular physical requirements are needed. There is an element of nervous strain in his work because of the need for attention to details. A tiny error may require time-consuming corrections in a program.

The usual workweek is 35 to 40 hours a week industry, and 40 hours in the Federal Governnt. A programmer may work evenings and ekends if he is at a point where he is trying out rk on the machine and he must make quick inges in the instructions.

Programmers usually receive liberal vaions, paid holidays and sick leave and are ered by life insurance, pension, hospital and dical benefit plans.

Salaries

The Bureau of Labor Statistics reports that grammers' salaries vary widely. Starting aries for programmers in business firms rage $5,000 a year, according to industry and ation. Salaries are generally increased annualfor a few years up to a maximum of $8,000. r programmers with supervisory duties the rage ranges up to $10,000. In the Federal vernment, salaries for programmers are comable with those in private industry. The great jority earn between $5,000 and $12,000 per ir. Higher salaries are earned for top-level ninistrators responsible for programming rk.

A college graduate can start as high as $7,000 l an experienced systems analyst may earn as ch as $14,000.

Personal Qualifications

Probably a programmer's most important perial qualification is a logical and analytical mind. must be accurate, have intellectual curiosity, enuity, patience and be capable of independent nking. He should be able to shift his thinking sily, as for example from work requiring creae thinking to that concerned with a mass of ails. Being good in mathematics is not an inlible indication of success in this work.

Educational Requirements

Education requirements for this occupation e not yet standardized. Some employees find it ictical to train people with only high school ication, while others think a college degree is essary. Employers often recommend such irses as logic, philosophy, mathematics, eneering or science. Courses in business adminration, accounting and statistics are also help-

Practically all organizations which use their nputers for scientific and engineering work re re their programmers to be college graduates h degrees in engineering, physics or mathetics. Graduate degrees may be required for ne positions; for almost all, an applicant who s no college training is at a severe disadvane.

Employers who use computers to process busiss records generally place somewhat less emisis on the need for college training. Many regard previous experience in related work equally important and fill many of their programmer positions by promoting qualified employees with such experience. However, when they find it necessary to hire outsiders, many give preference to applicants with education beyond high school. College courses in the general field of data processing, or in accounting, business administration, engineering or mathematics are regarded as especially good preparation.

Federal Civil Service requirements specify a college degree or equivalent in experience for beginning jobs in programming.

Many employees of business data processing programmers are also requiring a minimal business administration education, some even a business degree, for programmers engaged in the implementation of integrated management information systems.

Training for the Work

In this early state of the occupation specific training is generally the responsibility of firms using computer equipment and manufacturers of the equipment. Manufacturers set up training programs to which equipment users send trainees. Frequently after an organization has had experience in the work, it sets up its own in-service training program.

In a typical in-service program, the trainee spends several weeks on a combined lecture and practical demonstration series. Then he is given practice in writing and coding instructions and in testing the program on a computer. The student then spends some weeks in practice work with the computer. A usual training program varies from several months to a year.

There are at present more than 300 colleges and universities in the United States that offer courses in programming a computer, usually with a computer readily available on campus. Many more teach at least a basic course in programming.

Every year, new courses in data processing are offered by high schools, business schools, junior colleges, colleges and universities. A number of technical high schools and colleges offer this type of training, usually within their business departments. Some private business schools are now expanding their offerings to include computer programming classes.

Data processing courses are usually found within the departments of business, engineering, or mathematics. Full two-year college curricula in business data processing are offered by an increasing number of junior colleges. Some four-year institutions have bachelor's degree programs, and a growing number of graduate schools offer master's and doctor's degrees with majors in computer sciences and business data processing.

For the better paying administrative, systems,

:nd computer programming positions, a bache-
or's or higher degree is fast becoming a ne-
:essity.

Entering the Occupation

The usual way to enter this field of work is
o get into a trainee program. This requires in-
lividual applications to companies who have com-
)uter equipment or are planning to install a unit.
Sometimes these companies can be traced through
heir ads in newspapers for experienced pro-
grammers. Another possibility is to get in touch
vith computer manufacturers. They train pro-
grammers and know who is buying computer equip-
nent.

Promotional Opportunities

Opportunities for promotion in this work are
;ood. Electronic computer systems are rela-
ively elaborate. They require trained personnel
vith a variety of skills. Programmers in a typical
)rganization perform at several levels. A senior
)rogrammer is usually responsible for a complex
)rogramming job and supervision of other pro-
gramming staff. Below him may be one or more
)rogrammers who carry on large parts of complex
)rograms or prepare moderately difficult jobs.
Junior programmers carry out work on simple
)rograms or program parts following plans pre-
)ared by someone else. With the need for pro-
grammers constantly growing, programmers are
ible to move up the ladder almost as quickly as
hey gain skill and experience.

An authority in the field has said, "I personally
'eel that opportunities for advancement will be
nore and more reliant upon higher education. New
:echniques such as the sophisticated program lan-
guages makes basic programming a semi-
automatic procedure. You may note in current job
advertisements that not only a college degree, but
:xperience as well is generally required."

Employment Outlook

All signs point to an extraordinary increase in
employment in this occupation. There are now an
estimated 100,000 programmers at work. This,
of course, includes systems analysts and special-
ists such as mathematicians, whose primary
duties are related to computer programming.

The future market for electronic computers
appears to be very great. The computer is an es-
sential tool in the rapidly growing scientific and
engineering research for military and civilian
purposes. Its use is expanding and is just begin-
ning in equipment for factory automation. A grow-
ing number of companies are considering applying
computer techniques to their work. Despite the
many changes and improvements which have al-
ready taken place, computer technology is still in
a comparatively early stage of development. As
further changes will improve the computer, its
use will expand into areas not yet thought of.

The use of electronic data processing equip-
ment is expected to increase very rapidly and as
a result the number of jobs for programmers will
also increase.

Where Employed

The principal employers of programmers are
the U. S. Government in both military and civilian
agencies, research organizations, insurance com-
panies, public utilities, and scientific and engi-
neering laboratories. Manufacturers employ them
in offices and warehouses and a few work on pro-
duction inside the factory. Programmers are em-
ployed in industries producing electrical equip-
ment, aircraft, petroleum chemicals, steel and
banking. Some are employed in specialized com-
puting service firms which provide computer work
on a fee basis. Such firms have been set up in
many large cities.

For Further Reading

Should You Go Into Electronic Computer Programming? (PR 56) Free.
Career Information Service
New York Life Insurance Company
Box 51, Madison Square Station
New York, N.Y. 10010

Electronic Computer Operating Personnel and Programers, OOH Reprint #1375-50, 10 cents.
Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402

Careers in Electronic Data Processing, available to school counselors.
Project on Information Processing
Box 201, Montclair State College
Montclair, New Jersey 07087

A list of reading materials on career opportunities in programming may be obtained from:
Association for Computing Machinery
211 East 43 Street
New York, N.Y. 10017

Acknowledgments

We appreciate the cooperation of the following in reviewing the information contained in this brief.

JAMES M. ADAMS, JR., Director of Education, Data Processing Management Association, 524 Busse Highway, Park Ridge, Ill. 60068.

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SYSTEMS AND PROCEDURES ASSOCIATION, 7890 Brookside Drive, Cleveland 38, Ohio.

This Brief was made available through the Chronicle Occupational Brief Service and the Chronicle "3-in-1" Service (occupational, educational, professional information). Chronicle Guidance Publications, Inc., Moravia, New York. Single copies 35¢ by first class mail.

School plus
al Training

PROGRAMMERS

Finding Out About
PROGRAMMERS

job

Jill Fielding paused for a moment before entering the office building that stood on one side of the plant's parking lot. She gazed at the vast industrial scene that stretched before her – large, sprawling buildings, towering smokestacks, hundreds of men hurrying to work.

The central mill of the Mayfield Steel Company lay just beyond a narrow stretch of grass that some of the employees jokingly called the Park. A gray haze—smoke from the giant mill's blast furnaces and open hearths—hung over the surrounding countryside. The sun shimmered through the haze, promising a hot day.

As she entered the building, one of the secretaries commented on the heat. "Perhaps someone will invent a computer to regulate the weather," she said. "Then, Jill, will you plan temperature and rainfall for us?"

Jill laughed. "I'll do my best," she promised.

COMPUTERS SOLVE MANY DIFFERENT PROBLEMS

Jill was still smiling as she stepped off the elevator. The whole floor on which she worked was devoted to various kinds of electronic computers and to the people who were needed to operate them. In one large room on the floor was the 4400.

The machines at Mayfield Steel were similar to those used by many large companies, as well as by the government, to solve business and manufacturing problems and to process vast amounts of information and records.

Computers are designed to take information needed to solve a problem, do rapid calculations, and come up with an answer in a very short time. They can be designed to perform many different tasks—to track a satellite around the earth; to plan the trajectory (curved path) of a missile; to forecast weather; to control a production line in a factory; to design a new airplane; to figure out payrolls; even to translate from one language to another.

The 4400 was a data-processing machine. Information, or data, was recorded on magnetic tape in a code that the machine could "read," and then the tapes were fed into the machine. The information was stored in the memory unit of the machine until it was needed.

In a few hours the computer could solve complicated problems that it would have taken a small army of mathematicians and clerks weeks, months, even years to solve. For example, the computer could do a million additions per second.

The speed of the computer made it practical to solve many difficult problems. Mayfield Steel—just a few months before—had decided that it needed a new plant. But where should the plant be built? Many things had to be taken into account. Source of raw materials, labor supply, labor costs, transportation, and building costs were only a few. Finding the best combination of all these factors—or variables—would have been almost impossible without the 4400. The company officers still had to make the final decision, but they had solid facts instead of guesswork to help them make it.

Although computers are fantastically fast, they cannot think. Someone must tell them how to go about solving a problem. This was Jill's job as a programmer for the 4400. After she had worked out a step-by-step program of the necessary calculations, it was coded in machine language and fed to the computer.

INCORRECT INFORMATION CREATES MORE WORK

As Jill walked toward her office, she passed Mike Mitchell, another programmer. "Morning, Jill," he greeted her. "There are some new directives on your desk. Be with you in a minute."

Jill's desk was one of four in an office near the room where the 4400 was housed. The company felt that the programmers needed as much quiet as possible so that they could think and work properly. But occasionally the sounds on the floor penetrated Jill's concentration. She could tell much about what was happening from the different sounds. If the machines were working properly on problems, there was a soft whir that was rather soothing. But let something go wrong—an incorrect instruction given to a computer or trouble with one of the tapes—and the whole mood changed in a second. Lights flashed on the control board, and the soft whir became a peculiar noise that reminded Jill of a broken record.

Mike entered the office and came over to her desk. He picked up a bulky folder lying in her incoming-mail box.

"This stuff came in last night after you left, Jill," he said. "I thought you'd probably need it today for that problem you're working on."

"Thanks a million, Mike." Jill looked over a few of the notes and frowned. "But this will probably change the way the problem has to be set up!" she cried. "And I've worked out the first section of the problem."

Mike shrugged. "McVickers brought over the new information from the rolling mill last night," he said. "They were writing an end-of-the-month report and discovered

they had given you out-of-date information on their cost-accounting system."

Jill sighed. "I bet I'll just about have to start over from scratch. And to think I had already gone onto the machine to debug half of the first section. Getting a problem to the stage where I have only to check it for mistakes and then finding the information itself is wrong means a terrific waste of time."

"I know it's a real headache. McVickers said he'd be over this morning to go over these new figures with you. But before he comes, why don't you check with Roy. He's had a lot of experience as senior programmer, and he can probably help you salvage some of your work."

"I'll have to talk to him anyway," Jill said. "This problem was supposed to be finished by the end of the week. Management wants to know as soon as possible if the output of the rolling mill can be stepped up without increasing labor costs. These new figures give very different information about the way they break down the costs of labor and materials. With all the changing and reprograming I'll have to do, I don't think we'll have an answer for them on time."

Mike looked toward the door. "You're not going to have a chance to talk to Roy now. Here's McVickers."

WORKING OUT A PROGRAM FOR THE COMPUTER

Mr. McVickers, looking rather worried, came up to Jill's desk. "I hope we haven't caused you too much trouble, Miss Fielding," he said apologetically. "The mistake was certainly unfortunate. I'm terribly sorry."

"I'm sorry too, Mr. McVickers," Jill replied. "But now we have to get the problem in working condition."

"Just what is it that you have to do?" asked Mr. McVickers. "I'll certainly give you all the help I can, but I'm in the dark about the whole procedure."

"Well, the computer will do the actual calculations," said Jill. "I have to tell it step by step what to do—add, subtract, multiply, divide, or whatever. I had already prepared a flow chart. And I had completed the step-by-step program for the first part and tested it on the machine. These new data will change some of the information to be fed to the machine. I expect that they will also change the way in which we will plot the problem."

"Sounds very complicated," Mr. McVickers said.

"It's not as difficult as it sounds," said Jill. "The important thing is to analyze the problem correctly. That's a place where you can really help me, because you know the production setup. And after that, I have to be very careful to set up the program clearly and logically, without a single step missing. Then we translate the program into a code that the computer can understand. The machine takes over from there."

For the next two hours they worked steadily, as Mr. McVickers explained the figures and other information concerning the production steps in the rolling mill. Jill was deep in concentration on her work when Roy Plumer, the senior programmer, broke in. "Say, how about a cup of coffee, you two? You've been at it for a long stretch."

"I'm more than ready," said Mr. McVickers.

When Mr. McVickers and the two programmers had settled down in the employee lounge with cups of fresh hot coffee, Roy turned to Jill. "I've already heard about your problem. I've let Mr. Carson and some of the other brass know that we probably won't be able to make their deadline. They said O.K., but come up with the answer as soon as possible. You'll probably have to put in some overtime. But don't get so pressured you start making mistakes. It's more important to be sure we're accurate."

Mr. McVickers looked worried again. "That makes me feel worse than ever about our mistake. I've certainly become aware of the kinds of pressure you people work under. Don't you find it nerve-racking?"

"We're used to working under pressure," Roy replied. "Jill's a fine programmer. She never gets rattled."

Jill objected slightly. "It's pretty tiring sometimes—especially when something goes wrong or you make a bad mistake in a program. Sometimes I feel as if I were living in a state of organized chaos. But I'll say one thing—it's never dull! Well, let's get back to correcting that information for the 4400."

DIFFERENT JOBS FOR PROGRAMMERS

In general, there are two types of programmers. The first handles data-processing problems, such as analysis of census data or making up a payroll. The second deals with scientific or engineering problems, such as weather research or highway design.

Whatever his problem, a programmer starts by analyzing it to find the best way of putting it on the computer. Next he works out a flow chart—a diagram to show the order in which the various parts of the problem are to be handled. Then he writes up the program. In some cases the programmer may also translate the program into machine code. Finally, he debugs it by preparing sample information and testing the program on the computer. He corrects any errors in programing that show up.

Like Jill, he may find himself working under pressure —and having to be both fast and accurate.

SOME IMPORTANT FACTS ABOUT THE JOB

Education: A high school diploma is required for all programmers. Most employers prefer college graduates. For certain kinds of programing—such as in science areas—a college degree is required. All programmers are trained in computer techniques and application—sometimes by the employer, sometimes by manufacturers of computers, and sometimes in university computer centers.

High School Courses: The college-preparatory course should be taken, including English, science, and all the mathematics courses that are available.

College Courses: To handle problems in one of the scientific or engineering areas, a programmer needs a major in mathematics, one of the sciences, or engineering. Courses in business administration, accounting, and statistics are also helpful. A number of colleges and universities have computing centers and offer specific courses in this field.

Special Training: Special training programs in programing are usually given at company expense—often in special schools established by the manufacturers of electronic computing equipment. Large companies that have used computers for several years are beginning to develop their own training programs.

Where Jobs Are Found: Most programmers work in or near large centers of population. Jobs are found with insurance companies, public utilities, government agencies, banks, industries, laboratories, and computer centers.

Getting Started: College placement offices help graduates find jobs. Work can also be found through direct application to employers and through employment agencies.

Getting Ahead: In some programing fields the opportunities for advancement are limited. In other fields the programmer with education, training, and ability may be promoted to chief programmer, director of program analysis, chief of research, or some other supervisory position. Programmers sometimes reach the top management level.

Earnings: There is a wide salary range because of the difference in responsibility and skill required by programing jobs. Generally, starting salaries are between $4000 and $5500 a year. With experience the programmer can qualify for jobs paying $12,000 or more.

Number of Hours: The workweek for programmers is often very irregular. They may work long hours—sometimes almost round the clock—to meet deadlines.

Number of Workers: In 1957 there were 500 programmers. At that time it was estimated that by 1966 there would be jobs for 170,000 persons trained in the use of computers; most of these would be in business organizations.

Organizations: Association for Computing Machinery; Systems and Procedures Association of America.

Future: This is an expanding field with opportunities for qualified workers. There are many opportunities for women in programing.

OTHER WAYS OF FINDING OUT ABOUT THE JOB

Things To Do: Visit a bank, a business or manufacturing organization, or a government agency that uses electronic computers. Try to talk with a programmer and other persons who work with the machines.

Be accurate in all your math work. Train yourself to attack your math problems in a logical way.

Take part in debates to develop the habit of thinking logically. Remember that electronic brains cannot really think and that the programmer is the one who instructs a machine in problem solving.

Solve puzzles and play games of skill such as chess and checkers to develop the ability to think ahead and find solutions to problems. If you enjoy this kind of activity, you might be a good programmer.

Things To Read: *The Electronic Brain and What It Can Do*, by Saul Gorn and Wallace Manheimer. Chicago: Science Research Associates, 1956.

Introduction to Electronic Data Processing, by Roger W. Nett and Stanley Helzler. New York: Free Press, 1959.

Occupations in Electronic Data-Processing Systems, prepared by Occupational Analysis Branch, U.S. Employment Service, U.S. Department of Labor. Washington, D.C.: U.S. Government Printing Office, 1959.

"People Who Talk with Machines," by R. O'Brien. *Reader's Digest*, June 1961.

Programmers. (Occupational Brief No. 281.) Chicago: Science Research Associates, 1960.

Other Junior Occupational Briefs in which you would be interested are *Mathematicians; Statisticians; Systems Analysts.*

JOB Project Editor: Ann Williams Story by: Margaret Mary Kimmel
Science Research Associates, Inc., 259 East Erie Street, Chicago 11, Illinois

Information on COMPUTER PROGRAMMER
From the OCCUPATIONAL OUTLOOK HANDBOOK

PROGRAMERS

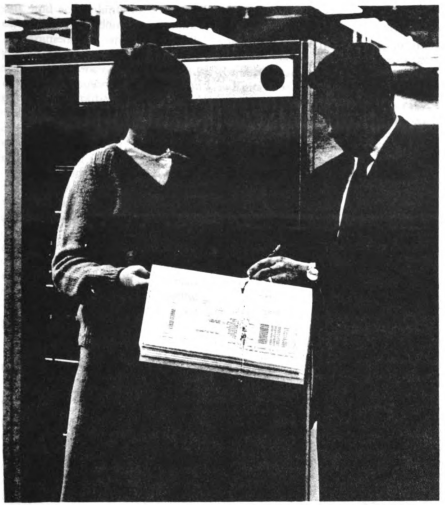
(D.O.T. 020.188)

Nature of Work

An electronic computer, even though sometimes called a *"mechanical brain,"* can only follow step-by-step instructions that tell it exactly what to do. The programer prepares these instructions.

A computer not only makes mathematical calculations at fantastic speeds, but stores many thousands of facts in its "memory" and later uses them to carry out its work. Because computers are able to work with masses of figures and facts at tremendous speed and with a high degree of accuracy, they are used for a great deal of "data processing" which would otherwise require the time of many employees. They handle such varied assignments as keeping inventories, controlling production machinery in factories, making long-range weather forecasts, doing legal research, and analyzing air traffic patterns. Some are tasks that could never be attempted on the same scale without a computer because of the excessive amount of time required. Still others, such as controlling the flight of a missile by instantaneously correcting deviations from the planned course, are tasks that would be impossible to accomplish without the speed of a computer.

Every "problem" processed in a computer must first be carefully



Computer programer checks results of test run with console operator.

analyzed so that exact and logical steps for its solution can be worked out. In some cases, the preliminary work is done by an experienced programer; in others, it may be done by a specialist known as a systems analyst. (See the statement on electronic data processing systems analysts elsewhere in the *Handbook*.)

Once this preliminary work has been completed, the "program," or detailed instructions for processing the data can be prepared by the programer. Exactly how he goes about this depends not only on the type of equipment to be used, but on the nature of the problem. The mathematical calculations involved in billing a firm's customers, for example, are very different from those required in most kinds of scientific and technical work. The programing techniques are also different. Still other techniques are required in writing programing "aids" which reduce the amount of detail associated with programing. Because of these differences, many programers specialize in certain kinds of work.

In business offices, where computers are frequently used to bill customers, make up payrolls, and keep track of inventories, the programer often starts his work by determining just which facts must be used to prepare documents such as customers' bills or employees' paychecks, and by ascertaining the exact form in which these facts are entered on company records. He then makes a flow chart, or diagram, showing the order in which the computer must perform each operation, and for each operation he prepares detailed instructions. These instructions, when they are relayed to the computer's control unit, tell the machine exactly what use is to be made of each piece of information, in order to produce each employee's paycheck or other business document. The programer is also responsible for preparing an instruction sheet for the console operator to follow when the program is run on the computer. (The work of the console operator is described in the chapter on Clerical and Related Occupations.)

The final step in programing is "debugging"—that is, checking on whether the instructions have been correctly written and will produce the desired information. A program is usually debugged in two steps. First, the programer takes a sample of the data to be processed and reviews step by step just what will happen as the computer follows the series of instructions which make up the program. Then, after he has revised the instructions to take care of any difficulties that have appeared, he completes the test by having a trial run made in the computer. The console operator sometimes helps with this part of the debugging process.

A comparatively simple program can be made ready for a computer within a very few days. A program which deals with a complex problem or is designed to produce many different kinds of information may require a year or more of preparation—sometimes by a large number of programers. On involved problems, several programers at different levels of responsibility often work as a team, under the supervision of a senior programer.

Where Employed

It is estimated that more than 100,000 programers were employed in mid-1966. In addition, some professional workers such as engineers, scientists, mathematicians, econo-

mists, and accountants spend a portion of their time doing programing.

Programers are employed chiefly by large business organizations and government agencies. A great many work for insurance companies and banks, public utilities, wholesale and retail establishments, and manufacturing firms of almost every kind. A considerable number are government employees doing work related either to scientific and technical problems, or to the processing of the vast amount of paperwork which must be handled in many government offices. In addition, a growing number of programers are employed by computer manufacturers and independent service organizations which furnish computer and programing services to business firms and other organizations on a fee basis.

Training, Other Qualifications, and Advancement

The special abilities most sought after by employers when they hire programers are similar for all types of positions, but requirements with respect to education and experience may be very different, depending mainly on the nature of the problems with which the programer will be dealing. Some programers are college graduates with degrees in engineering, for example, whereas others have had years of experience in such work as accounting or inventory control.

In selecting programers, employers look for people with an aptitude for logical thinking and the exacting kind of analysis which is part of the job. The work also calls for patience, persistence, and the ability to work with extreme accuracy. Ingenuity and imagination are particularly important in some jobs where programers have to work out new ways of arriving at solutions to problems.

In organizations which use their computers for scientific and engineering work, most programers are college graduates, usually with degrees in engineering, the physical sciences, or mathematics. Graduate degrees may be required for some positions; for almost all positions, an applicant who has no college training is at a severe disadvantage.

Employers who use computers to process business records generally place somewhat less emphasis on technical college training. Many regard previous experience in related work—in machine tabulation, for example, or in payroll work or accounting—equally important and fill many of their programer positions by promoting qualified employees with such experience. When employers find it necessary to hire outsiders, however, they usually give preference to applicants with education beyond high school. College courses in the general field of electronic data processing, or in accounting, business administration, engineering, or mathematics provide especially good preparation.

Entrance requirements for jobs in the Federal Government are much the same as those in private industry. For practically all entry programer positions in the Government, persons hired must have a college degree, preferably with training in mathematics, or else the equivalent of such preparation in previous work experience.

Young people interested in programing jobs can acquire some of the necessary skills at a steadily increasing number of technical schools, colleges, and universities. The instruction available ranges from introductory home study and extension courses to advanced work in computer technology at the graduate level. Courses in computer programing are also open to high school students in many parts of the country. High school and post-high school instruction do not entirely eliminate the need for on-the-job training, however. Since technological changes are continually taking place in this field and each type of computer has its own special programing requirements, some additional training is often necessary even in the case of experienced programers who change from one job to another.

Most beginners in this occupation start by attending training classes for a few weeks and then, as they work on minor programing assignments, continue with further specialized training. A year or more of experience is usually necessary before a programer can handle all aspects of his job without close supervision. Once he becomes skilled, his prospects for further advancement are good. Experienced and capable programers are in strong demand. In organizations employing several programers, promotion may be to a senior programing job with supervisory responsibilities. Advancement may also be to a position as systems analyst. An increasing number of programers eventually move up to management positions with their firms.

Employment Outlook

Many thousands of new jobs for programers will become available each year during the remainder of the 1960's and through the 1970's. Employment is expected to increase very rapidly, as an expanding and increasingly complex economy causes computers to become increasingly useful to business and government, and as the number of computer installations also rises rapidly. The increase in employment is expected to be particularly sharp in firms which use computers to process business records or to control manufacturing processes.

The rise in employment could well be accompanied by changes in the nature of the work done by programers. Largely because of advances in programing techniques and equipment—innovations such as "automatic programing," the use of programs and parts of programs stored in libraries for future use, and other changes—much is being done to eliminate the routine work associated with writing a program. As a consequence, professionally trained personnel qualified to handle both the

programing and the systems analysis, in the areas of their specialties, are likely to be increasingly in demand for work on scientific and engineering problems. For other positions, many of them in large business offices where the analysis is done by accountants and other subject matter experts, there is some evidence that 2 years of intensive training at the post-high school level may provide a sufficient background for beginning programers.

Most of the openings for programers in the years just ahead will be new jobs that arise as the number of computer installations continues to increase and computers are put to new uses. Some openings will also occur as programers advance to more responsible positions, or as they leave their jobs to enter other types of employment. Because this occupation includes many comparatively young workers, few positions are likely to become vacant because of retirement or death.

Earnings and Working Conditions

In 1966, salaries ranged from an average of about $7,300 a year for beginners to between $9,600 and $11,000 for experienced programers, according to a private survey which covered more than 2,000 business firms in all parts of the country. Programers with supervisory duties averaged up to $12,000 a year. The survey indicated substantial differences in the salaries of the lowest and highest paid individuals in the same kinds of positions, however, with some earning up to three times as much as others in the same group. These differences were probably due partly to the kind of data processed and the kind of computer used, and partly to the industry involved and its location.

Federal Government salaries for programers are comparable with those in private industry. The great majority earn between $6,451 and $14,217 a year. The minimum entrance salary for beginners was $5,331 a year in early 1967, and the top salaries of experienced programers responsible for complex programing or supervisory and administrative work ranged to $17,550 or more a year.

The standard workweek for programers is usually the same—about 40 hours—as the workweek for other professional and office workers. Unlike many computer console and auxiliary equipment operators who work on a 2- or 3-shift basis, programers usually work only during the day. Occasionally evening or weekend work may be necessary—for example, when it proves particularly difficult to "debug" a program.

Work places are usually modern offices, well-lighted and air conditioned. Employers recognize the desirability of providing the best possible work surroundings, because programers working under such conditions can concentrate more readily on the very exacting kind of analysis which is an essential part of their job.

Where To Go for More Information

Additional information about the occupation of programer may be obtained from:

Data Processing Management Association, 524 Busse Highway, Park Ridge, Ill. 60068.

A list of reading materials on career opportunities in programing may be obtained from:

Association for Computing Machinery, 211 East 43d St., New York, N.Y. 10017.

ROCHESTER CAREER GUIDANCE PROJECT

SUGGESTIONS: Some things to do to find out about career possibilities for you.

If you want to find out about certain careers in more detail (so that you can prepare to make better vocational and educational decisions), read the following list and try to carry out as many of the suggestions as you can.

1. Check the vocational information file in your guidance office, the school library, and your local library for materials of interest to you about careers which you might like. The Occupational Outlook Handbook and Career Briefs are usually good sources.

2. Talk with people you know who have some knowledge about jobs of interest to you. Think about neighbors, friends, and relatives you can ask about careers.

3. Discuss with your family, your guidance counselor, and some teachers, your career and educational possibilities.

4. Send away for more information about certain careers. Most occupational briefs tell where to write for more information.

5. Find out about part time jobs which will help you find out more about jobs and career fields of interest to you.

6. Visit a business or industry which you would like to learn more about. Find out what kind of jobs would be interesting to you.

7. Leave the attached request for more information with your guidance counselor or guidance secretary, TODAY.

8. Look over current magazines, bulletin boards, check TV schedules, for articles and programs about careers.

9. Look at catalogs for schools and colleges in the Rochester area. Find out what it is possible to take (major in) and what kind of jobs people take when they graduate from these schools.

APPENDIX B

Administrative Materials

Appendix B.1

Directions to proctors
for session one

Appendix B.2

Directions to proctors
for session two

Appendix B.3

Directions to proctors
for session three

ROCHESTER CAREER GUIDANCE PROJECT

INSTRUCTIONS FOR SESSION #1.

Statements enclosed in boxes should be read aloud to students. To the extent that it is possible, do not make other statements to them. Administrators should be relaxed and friendly.

Step #1. As students arrive, collect their passes and check off names on master group list. Twelve boys and twelve girls should be present.

Step #2.

> We are here today from the Career Guidance Project because we need your help in our study of vocational tests and materials. We are meeting with some ninth graders from several city schools because we want to find out your reactions to various career materials and to encourage you to explore information about future career possibilities. Today's meeting is the first of three to be held in the next month. We will meet with you again next week during this period but in room _____. Please make a special effort to be there.

> Over the past few years, many attempts have been made to help people, particularly high school students, make wiser vocational choices based on accurate information.
>
> Many of the vocational tests and materials which have been developed do not seem to be effective enough. It is because of this that the City School's Career Guidance Project is studying new and old ideas about tests and materials and observing the students who will use them. We will begin with the two inventories which you are about to receive.

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Step #3. Hand out one VDI booklet, one machine scored answer sheet, and one pencil to each student.

Step #4. Your machine scored answer sheet should be turned to side one which says attitude scale. Turn the sheet on your desk until the black piano key markings are at the top. Halfway down, notice the section which asks for your last name. Print your last name in the empty blocks starting at the left side. Skip one space and print your first initial. In the next space print your middle initial. Only one letter should appear in a box. Under each letter of your name find the same letter in a circle and blacken that space. Blacken the empty circle for the space between your last name and your initials. Next, blacken the circle above male if you are a male or blacken the circle above female if you are a female.
Under birth date, in the empty boxes, print the number of the month, day, and year in which you were born. Under each number which you have printed, blacken the same number with a circle around it. Fill in each empty space with a zero and blacken the circled zero under it. Continue in the same way to print your present age in years, your grade (09), test date (10-28-68), school, and form (4). Check to be sure that under each box you have blackened the same letter or number.
Do not make any marks outside of the circle which you want to blacken. If you should happen to break your pencil, please raise your hand.
Now, turn your answer sheet so side one appears at the top of the sheet. We will be using the section called attitude scale, part one.

Step #5. Next, look at the directions on the outside cover of your question book. They say, "(read directions)". We will now begin the inventory. There are no right or wrong answers but there is a best answer for you for each question. I will quickly read each item but if you wish to go ahead by yourself, you may.

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Step #6. Number one "_____".

Step #7. We will now collect your answer sheets and question booklets. Please keep your pencils.

Step #8. Collect VDI booklets and answer sheets. Place answer sheets in envelope labeled with period number, group number, room number, date, and name of school.

Step #9. Hand out job interests list (Jil) and read directions aloud. When most students have listed four or more jobs begin to collect these forms. Be sure names are on each sheet.

Step 10. Hand out the student reaction sheet-tests. Read directions aloud. Collect these forms before the last five minutes of the period. Be sure names are on each sheet. Collect pencils.

Step 11. Just before the end of the period, read the following statement.

"Thank you for your cooperation in the first part of this study. Next week at this same time in room_____ we will be showing you some materials which you probably have not seen before and we will be most interested in your reactions."

ROCHESTER CAREER GUIDANCE PROJECT

INSTRUCTIONS FOR SESSION #2.

Statements enclosed in boxes should be read aloud to students. To the extent that it is possible, do not make other statements to them. Administrators should be relaxed and friendly.

Step #1. As students arrive, collect their passes and check off names on master group list.

Step #2. We are glad you are back this week. You remember that we are here from the Career Guidance Project because we need your help in our study of vocational materials. We are urging you to explore information about future career possibilities for you, not just today, but whenever you can. Today, we want to find out your reactions to the materials you are about to see. Please pay careful attention.

Step #2A See extra directions for group 14.

Step #3. Show movie or slide-show assigned to group.

Step #4. Near end of presentation, distribute packet containing:

a. Student reaction sheet.

b. Knowledge (T,F) of Computer Programming.

c. Request for more information form.

d. Suggestions to students list.

Step #5. At conclusion of presentation, read aloud the directions for student reaction sheet. Have students fill out these forms.

ROCHESTER CAREER GUIDANCE PROJECT

Step #6. Read aloud, the directions for knowledge of computer programming test. Quickly read each item. Collect completed forms and tests.

Step #7. Read aloud, the directions for the request for more information form. Your request for more information will be processed by the Career Guidance Project Staff as rapidly as possible. Please add your home-room number after your name on this form.

Step #8. The next sheet which you have been given is called "Suggestions." We believe that for anyone to make wise choices or decisions about a career, he should consider all alternatives and gather accurate information about his possibilities. Most of the information which you have received has been about the field of computer work, but these suggestions should be used to help you find out about any career that you wish to explore. Remember we believe that any choices you make in the future should be wise, informed choices based on accurate information.

Read directions from "suggestions" list.
Read items quickly out loud.

Step #9. For the rest of this period, please read over these suggestions and think about how you might carry out some of them.

INSTRUCTIONS FOR SESSION #2

GROUP 14 STEP #2-A

Hand out brief booklet containing SRA-work and chronicle briefs on Computer Programmer and the Occupational Outlook Handbook on Programming.

You have been given a copy of the best available printed materials on the Occupation of Computer Programmer. We want to know which of these three briefs you find most helpful so please look them over carefully in the next twenty minutes.

Group 14 should receive special student reaction sheet.

ROCHESTER CAREER GUIDANCE PROJECT

INSTRUCTIONS FOR SESSION #3

Statements enclosed in boxes should be read aloud to students. To the extent that it is possible, do not make other statements to them. Administrators should be relaxed and friendly.

Step #1. As students arrive, collect their passes and check off names on master group list.

Step #2.

> It has been two weeks since we last urged most of you to explore your future career possibilities. Today we want to find out your current thinking about career possibilities. To do this, you will take two inventories for the second time and a new one. Answer all items as carefully as you can. Do not worry about how you may have responded three weeks ago. React to the statements in terms of how you think and feel today. Be as honest with yourself as possible.

Step #2A. FOR THIRD PERIOD ONLY.

> Some of you are here for the first time today. We have been asking students in several city schools to help us in our study of vocational materials and inventories. And today we will appreciate your cooperation as well.

Step #3. Hand out one V.D.I. booklet, one machine scored answer sheet, and one pencil to each student.

ROCHESTER CAREER GUIDANCE PROJECT
(continued)

Step #4. Side one of your answer sheet should be turned so that the black piano key markings are at the top. On the left side, about half way down, print your last name in the empty blocks. Skip one space after your last name and print your first and middle initials.

Under each letter of your name find the same letter in a circle and blacken that space. Blacken the empty circle for the space between your last name and your initials.

Next blacken the circle above male if you are a male or blacken the circle above female if you are a female.

Under birth date, in the empty boxes, print the number of the month, day, and year in which you were born. January is 01, February 02, March 03 and so on. Moving to the right, in the appropriate empty boxes, print your age in years, your grade (09), test date (11/18/68), school (60, 64, 65, 67), and form (4).

Under each number which you have printed, blacken the same number with a circle around it.

When you are finished turn your answer sheet so side one appears at the top of the sheet- the black piano key markings will be in the left margin.

We will be using the section called attitude scale, part one.

Step #5. Now look at the directions on the outside cover of your question booklet. They say (read directions)

There are no right or wrong answers but there is a best answer for you for each question. Remember- answer each question on the basis of how you feel today-regardless of how you may have answered before.

I will quickly read each item but if you wish to go ahead by yourself, you may. (Read VDI)

ROCHESTER CAREER GUIDANCE PROJECT
(continued)

Step #6. We will now collect your answer sheets and question sheets and question booklets.

Place answer sheets in envelopes provided.

Step #7. Hand out Job Interests List and read directions aloud.

Step #8. Collect J.I.L. forms.

Step #9. Hand out VEBI forms and read directions. Hand out forms A, B, C, and D only as needed.

Step #10. Collect VEBI forms.

Step #11. (Optional)
If time permits, hand out Student Reaction Sheets-Tests and Inventories, and have students fill them out for the VEBI.

Step #12. Hand out and read directions on Student turn-in forms.

Step #13. Our final thanks to you for your tremendous help these past few weeks. Please take advantage of the many opportunities for you to do things now which will help you in future decisions. As results of our study become available in the next two months we will be sharing them with your counselor(s) and principals.

For those of you who requested materials two weeks ago, they are being delivered this week to your counselor who will pass them on to you.

Our best wishes to you.

APPENDIX C

CRITERION INSTRUMENTS

Appendix C.1

Vocational Exploratory Behavior Inventory

Appendix C.2

Turn in form - Request for more information

Appendix C.3

Turn in form - request to meet a worker or visit a work site

Appendix C.4

Vocational Development Inventory and answer sheet

Appendix C.5

Test of Knowledge - Computer Programming

Appendix C.6

Job Interest List

Appendix C.7

Student Response Form - Tests and Inventories

Appendix C.8

Student Response Form - Occupational Materials

ROCHESTER CAREER GUIDANCE PROJECT
VOCATIONAL EXPLORATORY BEHAVIOR INVENTORY
(STANFORD UNIVERSITY)

DIRECTIONS FOR THE STUDENT

This inventory asks you questions about what you have done during the past two weeks. Through it, we hope to determine what high school students do when they explore different occupations or vocations.

Read each question slowly and then carefully think about your answer. If you need help in understanding or answering any question, hold up your hand and a staff member will come to assist you.

The more care and interest you show in answering these questions, the more you will help us in the final stage of our study of vocational tests and materials.

IMPORTANT NOTE:

All of the questions will concern your activities during the past two weeks. When you are asked what you have done during this time, we mean since the day you studied some of the vocational materials-films and booklets-which we presented to you. If you wish to check on a specific date during this month, use the following calendar.

NOVEMBER

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

Vocational Exploratory Behavior Inventory
Page 1

SECTION A

HAVE YOU TALKED WITH ANY OF THE FOLLOWING PEOPLE IN THE LAST TWO WEEKS (SINCE SEEING THE VOCATIONAL MATERIALS)?

	YES	NO
1. Persons <u>now working</u> at the types of occupations you are considering? If you answered "Yes," with how many persons did you talk?. . #____	____	____
2. Persons who <u>have worked</u> in the past at the types of occupations you are considering? If you answered "Yes," with how many persons did you talk?. . #____	____	____
3. Persons who <u>know about</u> the types of occupations you are considering (persons other than those mentioned above) even though they have never worked at these occupations? If you answered "Yes," with how many persons did you talk?. . #____	____	____
4. Persons <u>attending or who have attended</u> schools or colleges you are interested in attending in order to receive the training and education you need for the types of occupations you are considering? If you answered "Yes," with how many persons did you talk?. . #____	____	____
5. Persons who <u>know about</u> these schools or colleges, even though they did not attend them? If you answered "Yes," with how many persons did you talk?. . #____	____	____
6. If you have not mentioned them already, during the past two weeks have you talked with high school counselors, teacher advisers, business teachers or other school persons about the types of occupations you are considering? If you answered "Yes," with how many persons did you talk?. . #____	____	____

Vocational Exploratory Behavior Inventory
Page 2

Section A - continued

	YES	NO
7. If you have not mentioned them already, during the two weeks have you talked with parents, family members and relatives, close friends or neighbors about the types of occupations you are considering?	____	____
If you answered "Yes", with how many persons did you talk?. . . # ____		
8. Are there any other persons to whom you have talked during this time about the types of occupations you are considering?	____	____
If you answered "Yes", with how many other persons did you talk?. . . . # ____		

Now, add the numbers you have written in the boxes. In other words, what is the total number of people to whom you have spoken? # ____

Then, if your total is more than zero, ask one of the interviewers for one copy of "Form A" for each person you mentioned. Complete one copy of "Form A" for each person. When you finish all copies of "Form A", go on to the next page.

If your total is zero, go on to the next page now.

Vocational Exploratory Behavior Inventory
Page 3

SECTION B

HAVE YOU DONE ANY OF THE FOLLOWING IN THE LAST TWO WEEKS?

	YES	NO
9. Have you written any place for information (pamphlet, bulletin, catalog) on occupations or on schools or colleges where you could get training and education for these occupations?	____	____
If you answered "Yes", how many letters did you write?. . . . # ____		
10. Have you looked at or read any books, magazines, bulletin board posters, or pamphlets about the type of occupations you are considering?	____	____
If you answered "Yes", how many different things did you look at or read?. . . . # ____		
11. Have you bought, borrowed or checked out of the library any vocational reading materials which you have not yet had a chance to read?	____	____
If you answered "Yes", how many things did you obtain?. . . . # ____		
12. Have you looked at or read similar things about types of occupations other than ones you are considering?	____	____
If you answered "Yes", how many different things did you look at or read?. . . . # ____		
13. Have you watched attentively any T.V. programs, fair exhibits, or movies, or heard any radio programs in the last two weeks, about occupations or schools and colleges that interest you?	____	____
If you answered "Yes", how many things did you listen to or see?. # ____		

Vocational Exploratory Behavior Inventory
Page 3 (continued)

Once again, add the numbers you have written in the boxes.
What is the total number of things you have done under Section B? #_____

Then, if your total is more than zero, ask one of the interviewers for one copy of "Form B" for each thing you mentioned.
Complete one copy of "Form B" for each separate thing you did.
When you finish, go on to the next page.

If your total is zero, go on to the next page now.

Vocational Exploratory Behavior Inventory
Page 4

SECTION C

HAVE YOU VISITED OR MADE PLANS TO VISIT ANY OF THE FOLLOWING IN THE LAST TWO WEEKS?

	YES	NO
14. Have you made on-the job visits to see what the types of occupations you are considering are like?	____	____
If you answered "Yes", how many places did you visit?. . . . # ____		
15. Have you made definite plans to make on-the-job visits to see what the types of occupations you are considering are like, but have not yet made these visits?	____	____
If you answered "Yes", how many places did you make definite plans to visit?. . . . # ____		
16. Have you visited any of the schools or colleges where you could get training and education for these occupations that you are considering?	____	____
If you answered "Yes", how many schools or colleges did you visit?. # ____		
17. Have you made definite plans to visit any schools or colleges where you could get training and education for these occupations that you are considering?	____	____
If you answered "Yes", how many placed did you make definite plans to visit?. . . . # ____		

Once again, add the numbers you have written in the boxes. What is the total number of visits you have made or planned under Section C? # ____

Then, if your total is more than zero, ask one of the interviewers for one copy of "Form C" for each visit you have mentioned. Complete one copy of "Form C" for each separate visit. When you finish, go on to the next page.

If your total is zero, go on to the next page now.

Vocational Exploratory Behavior Inventory
Page 5

SECTION D

OTHER IMPORTANT INFORMATION

	YES	NO
18. In the last two weeks, have you looked into or made definite plans to look into getting a summer or part-time job that is connected with the types of occupations you are considering?	____	____
If you answered "Yes", how many jobs have you looked into or made definite plans to look into?. . ____ #		
19. In the last two weeks, have you looked into or made definite plans to look into getting a summer or part-time job to make money for future training or education expenses?	____	____
If you answered "Yes", how many jobs have you looked into or made definite plans to look into?. . ____ #		
20. In the last two weeks, have you taken or made definite plans to take any tests (other than regular classroom tests) in order to find out more about your classroom tests) in order to find out more about your interests, abilities or achievements?	____	____
If you answered "Yes", how many tests have you taken or made definite plans to take?. . . . ____ #		
21. In the last two weeks, have you had a change in your occupational interests that has led you to consider probably changing your course of study in high school?	____	____
If you answered "Yes", how many times has this occured during this last month?. . . . ____ #		

22. What does your father (or guardian) do at work?_____

If your mother is employed, what does she do? _____

Once again, add the numbers you have written in the boxes. What is the total number of things you have done or planned to do under Section D?

Then, if your total is more than zero, ask one of the interviewers for one copy of "Form D" for each separate thing you mentioned. Complete one copy of "Form D" for each separate thing.

Vocational Exploratory Behavior Inventory
Page 6

PLEASE PRINT YOUR NAME _____

FORM A

WITH WHOM HAVE YOU TALKED?

(Section A: Questions 1-8)

1. For which question are you using this form? _____

2. What is the name of the person with whom you talked? _____

_____

3. What is his address or how can this person be reached?

_____

4. What did you talk about?
   Careers in the computer field?____ Other Occupations?_____
   Schools? ____ Other Topics? _____
   _____
   Please specify.

5. About what types of occupations did you talk with this person?

_____

6. How many times during this past month did you talk with this person about this topic?_____Did you talk by telephone?_____ or in person?_____About how many minutes did you talk with this person about this topic?
   Under 15?_____ 15-60?_____ Over 1 hour? _____

7. What was the date when you talked with this person?_____

8. Is this person on the high school staff?_____ A relative?_____

   If other, specify_____

9. What was your main purpose in talking with this person?

_____

10. Did you decide to talk with this person_____or was it required for a class or a group? _____

11. What do you believe is the most important fact you learned from the conversation?

_____

Vocational Exploratory Behavior Inventory
Page 7

PLEASE PRINT NAME _____

FORM B

WHAT HAVE YOU WRITTEN FOR, LOOKED AT, READ, OR OBTAINED?

(Section B: Questions 9-13)

1. For which question are you using this form? _____

2. What was the name or title of the material?

_____

4. From where did you receive the material?

Checked out of the library _____

Obtained as permanent possession _____

Borrowed from someone _____

Sent for by mail _____

5. From whom did you get the material?

Name: _____

Address: _____

6. When did you get the material? Date: _____

7. What was your purpose in using the material? What was the material about? _____

8. What was the most important fact you learned from the material?

_____

_____

FORM C

VISITS MADE OR PLANNED

(Section C: Questions 14-17)

1. For which question are you using this form? _____

2. Was your visit definitely made _____ or is it planned for later? _____

3. Did you decide to make (or plan to make) this visit_____ or was it required for a class or group? _____

4. Is this visit related to schools _____ or to occupations?____

5. If your visit is related to occupations, what occupation was involved?_____

6. What is the name of the person or the place you visited or plan to visit?

   Person's name: _____

   Person's position: _____

   Place's name: _____

   Address of person or place: _____

   _____

7. What was the date of your visit or when did you make definite plans for this visit? _____

8. How much time did you spend (or will you spend) with this person or at this place?

9. What was (or will be) the purpose of your visit?

   _____

10. What is the most important fact you learned (or hope to learn) from the visit?

    _____

PLEASE PRINT NAME_____

FORM D

OTHER IMPORTANT INFORMATION

(Section D: Questions 18-21)

A. If you are using this form for questions 18 and/or 19, answer the following questions. If you are using it for other questions, go on to the next page.

1. Did you get the summer or part-time job?_____or do you have definite plans to obtain one?_____or did you look and have not been successful so far?_____

2. Will you be paid for your work?_____ or are you volunteering?_____

3. Are you interested in the job because it is connected with the types of occupations you are considering?_____ or is it to make money for your future training or education expenses?_____ or both?_____

4. What will you be doing on the job?

_____

5. Who did you contact for the job or do you hope to contact?

Name:_____

Address:_____
(or how they can be reached)

6. When did you first talk to this person about the job or make definite plans to talk to this person?

Date:_____

7. What is (or will be) the place at which you have (or hope to have) the job?

Name:_____

Address:_____

8. How, if at all, is the job connected with your occupational interests?

_____

Vocational Exploratory Behavior Inventory
Page 10

Form D - continued

B. If you are using this form for Question 20, answer the following questions:

1. What tests did you take or make definite plans to take?

_____

2. When did you take them or make definite plans to take them?

Date: _____

3. With whom did you make the arrangements for these tests?

Person: _____ Position: _____

Address: _____

4. What is the purpose of taking these tests?

_____

5. Did you take them (or do you hope to take them) in order to help you make decisions about certain occupations? _____
If so, which ones? _____

C. If you are using this form for Question 21, answer the following questions:

1. What was the change in your occupational interests that you have had during this time? _____

_____

2. When did this occur? Date: _____

3. With whom have you talked concerning the possibility of changing your course of study?

Person: _____ Position: _____

Address: _____

4. What has caused this change in your occupational interests?

_____

ROCHESTER CAREER GUIDANCE PROJECT

If you want more information about careers, please fill in this form and leave it with your guidance counselor or guidance secretary TODAY.

Your name _____

Address _____

_____

Please send me the following information.
(check ONE item only)

1. List of additional suggestions for students wishing to investigate careers in the computer field in more detail.

2. Information about the following job in the computer field _____.

3. If it is available, information about a job in another field.
Name the job. _____

ROCHESTER CAREER GUIDANCE PROJECT

If you would like to explore a specific job or career field in greater depth than you have been able to so far, it may be possible for you to be introduced to a person who actually works in the field of your choice. Perhaps a visit to the business or industry can also be arranged.

If you are interested, please return this form in person to your guidance counselor or guidance secretary today.

Your name _____

Career or career field of interest to you ___

_____

Vocational Development Inventory

Attitude Scale

JOHN O. CRITES, Ph.D.
THE UNIVERSITY OF IOWA

DIRECTIONS:

There are a number of statements about occupational choice and work listed in this booklet. Occupational choice means the kind of job or work that you think you will probably be doing when you finish all of your schooling.

If you agree or mostly agree with the statement, use your pencil to blacken the circle in the column headed *T* on the separate answer sheet. If you disagree or mostly disagree with the statement, blacken the circle in the column headed *F* on the answer sheet. Be sure your marks are heavy and black. Erase completely any answer you wish to change.

FORM IV: FOR RESEARCH PURPOSES ONLY

Part I

1. Once you choose a job, you can't choose another one.
2. In order to choose a job, you need to know what kind of person you are.
3. I plan to follow the line of work my parents suggest.
4. I guess everybody has to go to work sooner or later, but I don't look forward to it.
5. A person can do any kind of work he wants as long as he tries hard.
6. I'm not going to worry about choosing an occupation until I'm out of school.
7. Your job is important because it determines how much you can earn.
8. Work is worthwhile mainly because it lets you buy the things you want.
9. The greatest appeal of a job to me is the opportunity it provides for getting ahead.
10. I often daydream about what I want to be, but I really haven't chosen a line of work yet.
11. Knowing what you are good at is more important than knowing what you like in choosing an occupation.
12. Your parents probably know better than anybody which occupation you should enter.
13. If I can just help others in my work, I'll be happy.
14. Work is dull and unpleasant.
15. Everyone seems to tell me something different, until now I don't know which kind of work to choose.
16. I don't know how to go about getting into the kind of work I want to do.
17. Why try to decide upon a job when the future is so uncertain.
18. I spend a lot of time wishing I could do work that I know I cannot ever possibly do.
19. I don't know what courses I should take in school.
20. It's probably just as easy to be successful in one occupation as it is in another.
21. By the time you are 15, you should have your mind pretty well made up about the occupation you intend to enter.
22. There are so many things to consider in choosing an occupation, it is hard to make a decision.
23. I seldom think about the job I want to enter.
24. It doesn't matter which job you choose as long as it pays well.

25. You can't go very far wrong by following your parents' advice about which job to choose.
26. Working is much like going to school.
27. I am having difficulty in preparing myself for the work I want to do.
28. I know very little about the requirements of jobs.
29. The job I choose has to give me plenty of freedom to do what I want.
30. The best thing to do is to try out several jobs, and then choose the one you like best.
31. There is only one occupation for each person.
32. Whether you are interested in a particular kind of work is not as important as whether you can do it.
33. I can't understand how some people can be so set about what they want to do.
34. As long as I can remember I've known what kind of work I want to do.
35. I want to really accomplish something in my work—to make a great discovery or earn lots of money or help a great number of people.
36. You get into an occupation mostly by chance.
37. It's who you know, not what you know, that's important in a job.
38. When it comes to choosing a job, I'll make up my own mind.
39. Choose an occupation which gives you a chance to help others.
40. When I am trying to study, I often find myself daydreaming about what it will be like when I start working.
41. I have little or no idea of what working will be like.
42. Choose an occupation, then plan how to enter it.
43. I really can't find any work that has much appeal to me.
44. Choose a job in which you can someday become famous.
45. If you have some doubts about what you want to do, ask your parents or friends for advice and suggestions.
46. Choose a job which allows you to do what you believe in.
47. The most important part of work is the pleasure which comes from doing it.
48. I keep changing my occupational choice.
49. As far as choosing an occupation is concerned, something will come along sooner or later.
50. Why worry about choosing a job when you don't have anything to say about it anyway.

VOCATIONAL DEVELOPMENT INVENTORY

RESEARCH EDITION

SIDE 1

WHAT OCCUPATION DO YOU PLAN TO ENTER? BE AS SPECIFIC AS POSSIBLE. IF YOU HAVE NO OCCUPATIONAL CHOICE, THEN PUT "UNDECIDED." PLEASE PRINT.

_____

_____

_____

ATTITUDE SCALE

PART 1

	T	F		T	F		T	F		T	F
1	○	○	14	○	○	27	○	○	40	○	○
2	○	○	15	○	○	28	○	○	41	○	○
3	○	○	16	○	○	29	○	○	42	○	○
4	○	○	17	○	○	30	○	○	43	○	○
5	○	○	18	○	○	31	○	○	44	○	○
6	○	○	19	○	○	32	○	○	45	○	○
7	○	○	20	○	○	33	○	○	46	○	○
8	○	○	21	○	○	34	○	○	47	○	○
9	○	○	22	○	○	35	○	○	48	○	○
10	○	○	23	○	○	36	○	○	49	○	○
11	○	○	24	○	○	37	○	○	50	○	○
12	○	○	25	○	○	38	○	○			
13	○	○	26	○	○	39	○	○			

PART 2

	T	F		T	F		T	F		T	F
1	○	○	14	○	○	27	○	○	40	○	○
2	○	○	15	○	○	28	○	○	41	○	○
3	○	○	16	○	○	29	○	○	42	○	○
4	○	○	17	○	○	30	○	○	43	○	○
5	○	○	18	○	○	31	○	○	44	○	○
6	○	○	19	○	○	32	○	○	45	○	○
7	○	○	20	○	○	33	○	○	46	○	○
8	○	○	21	○	○	34	○	○	47	○	○
9	○	○	22	○	○	35	○	○	48	○	○
10	○	○	23	○	○	36	○	○	49	○	○
11	○	○	24	○	○	37	○	○	50	○	○
12	○	○	25	○	○	38	○	○			
13	○	○	26	○	○	39	○	○			

OTHER INFORMATION

OCCUPATIONAL CHOICE — DOT — ROE

ITBS ITED

(FOR MRC USE ONLY)

TEST DATE — MONTH — DAY — YEAR — SCHOOL — FORM

GR

AGE IN YEARS

BIRTH DATE — MONTH — DAY — YEAR

SEX ○ MALE ○ FEMALE

NAME
LAST, FIRST INITIAL, MIDDLE INITIAL

COMMENTS

JANUARY	01
FEBRUARY	02
MARCH	03
APRIL	04
MAY	05
JUNE	06
JULY	07
AUGUST	08
SEPTEMBER	09
OCTOBER	10
NOVEMBER	11
DECEMBER	12

ROCHESTER CAREER GUIDANCE PROJECT

KNOWLEDGE ABOUT COMPUTER PROGRAMMING

Circle T (true) or F (false) for the best answer to each of the following questions.

T F 1. It is unusual for a programmer to work overtime.

T F 2. A flow chart or flow diagram is used to explain how a computer programmer spends his time on the job.

T F 3. The job of computer programmer is likely to remain about the same, in the future, as different computers and techniques become available.

T F 4. Programs are sometimes stored in libraries so they can be used over and over again.

T F 5. Computers, sometimes called mechanical brains, can only follow step-by-step instructions that tell them exactly what to do.

T F 6. Experienced and capable programmers are badly needed at present.

T F 7. Banks rarely employ programmers.

T F 8. Computers cannot be used for controlling production machinery in factories.

T F 9. Programmers sometimes work in teams on special projects.

T F 10. Some people become programmers by first becoming systems analyists.

T F 11. Logical thinking, attention to detail and persistence are most important characteristics for programmers to have.

T F 12. Work situations are usually modern, well lighted and air conditioned because the computers need to be kept at a constant temperature.

T F 13. A person, to become a computer programmer, must have a college degree in mathematics, business, or data processing.

T F 14. "Debugging" is what a machine repairman does when a computer breaks down.

ROCHESTER CAREER GUIDANCE PROJECT

KNOWLEDGE ABOUT COMPUTER PROGRAMMING

Circle T (true) or F (false) for the best answer to each of the following questions.

T F 15. The average age of persons employed at present as programmers is about the same as in other jobs which require the same post high school education.

T F 16. A program is a series of step-by-step instructions that tell a computer exactly what to do.

T F 17. Many experienced programmers are able to make more than $30,000 a year.

T F 18. After a person gets a job as a programmer, he spends much time getting more training.

T F 19. Usually at least four years of experience is necessary for a programmer to handle all aspects of his job without close supervision.

T F 20. The number of programmers needed in 5 years will be about what it is now.

T F 21. At present, there is a great need for programmers who have had experience.

ROCHESTER CAREER GUIDANCE PROJECT

JOB INTERESTS LIST

Your name_____

Very quickly, list specific jobs or positions which you think you might like, Jobs you would like to work at.

_____

_____

_____

_____

_____

_____

_____

_____

ROCHESTER CAREER GUIDANCE PROJECT

STUDENT REACTION SHEET - TESTS AND INVENTORIES

1. I thought this inventory was _____

_____

2. Sometimes I felt confused about what a question meant?
Yes_____, No_____.

3. The worst things about this inventory were __

_____

_____

_____

4. The things I liked best about it were ___

_____

_____

_____

5. Any other comments _

_____

_____

_____

ROCHESTER CAREER GUIDANCE PROJECT

STUDENT REACTION SHEET

Your name_____

Quickly answer the following questions about the vocational materials which have just been presented to you.

Circle the letter in front of the statement which best tells how you feel. Be honest- your true reactions are important to us.

1. How interested were you in the materials?

   A. I was very interested
   B. Fairly interested
   C. Not very interested
   D. Not at all interested

2. What did you think of the materials?

   A. Excellent- some of the best I have seen
   B. Good- better than most
   C. Fair- average- like most I have seen
   D. Poor- not as good as most I have seen
   E. Horrible- some of the worst I have ever seen

3. How much have the materials made you want to get more information about careers.

   A. A lot
   B. A little
   C. Undecided- I don't know
   D. Not much
   E. Not at all

4. Comments_____

APPENDIX D

Tables D.1 through D.24

TABLE D.1

MEAN SCORES FOR VEBI - SECTION A

	Schools		Treatment Conditions E_1	E_2	E_3	C_1	C_2	C_3
OUTER	Charlotte H.S.	Male	4.00	2.50	2.62	3.28	0.71	3.29
		Female	4.44	4.32	2.16	2.71	3.00	3.71
	Marshall H.S.	Male	2.50	5.89	2.50	1.50	4.11	2.75
		Female	7.40	2.57	2.20	2.16	3.12	2.40
INNER	Madison H.S.	Male	1.00	2.87	4.28	3.12	4.00	1.50
		Female	2.86	1.43	3.71	5.67	5.43	1.00
	West H.S.	Male	2.50	4.17	1.00	3.14	2.67	1.78
		Female	4.44	4.40	0.86	0.73	0.50	1.17

TABLE D.2

ANALYSIS OF VARIANCE FOR

VEBI-SECTION A; MAIN EFFECTS

AND SIGNIFICANT INTERACTIONS

Source of Variation	Degrees of Freedom	Sums of Squares	Mean-Square	F*
G - Treatments	5	13.36	2.67	1.72
G_1 - ($E_1E_2E_3$ x $C_1C_2C_3$)	1	3.61	3.61	2.32
G_2 - (E_1E_2 x E_3)	1	7.31	7.31	4.65*
G_3 - (E_1 x E_2)	1	0.06	0.06	0.04
G_4 - (C_1 x C_2C_3)	1	0.25	0.25	0.16
G_5 - (C_2 x C_3)	1	2.21	2.21	1.42
S - Schools	3	6.81	2.27	1.46
S_1 - (Inner x Outer)	1	2.80	2.80	1.81
S_2 - (Within Inner)	1	3.77	3.77	2.42
S_3 - (Within Outer)	1	0.23	0.23	0.15
X - (Male x Female)	1	0.46	0.46	0.23
G_3 x X	1	8.77	8.77	5.64*
Error	15	23.32	1.55	
Total	48	104.79		

* 4.54 is the critical F value at the 0.05 level of significance for 1 and 15 df; 3.29 for 3 and 15 df; and 2.90 for 5 and 15 df.

TABLE D.3

MEAN SCORES FOR VEBI - SECTION B

	Schools		Treatment Conditions E_1	E_2	E_3	C_1	C_2	C_3
OUTER	Charlotte H.S.	Male	3.00	2.00	0.75	4.00	0.71	3.56
		Female	0.57	3.89	0.67	2.00	1.60	5.71
	Marshall H.S.	Male	0.50	2.55	5.00	1.66	1.77	1.62
		Female	0.40	0.57	2.30	0.83	1.62	0.20
INNER	Madison H.S.	Male	1.14	2.12	1.71	2.87	4.00	0.50
		Female	1.57	1.43	4.14	2.67	4.43	0.67
	West H.S.	Male	4.50	3.33	0.57	0.14	2.67	1.89
		Female	3.14	2.80	2.14	1.45	0.50	1.67

TABLE D.4

ANALYSIS OF VARIANCE FOR

VEBI-SECTION B; MAIN EFFECTS

AND SIGNIFICANT INTERACTIONS

Source of Variation	Degrees of Freedom	Sums of Squares	Mean-Square	F*
G - Treatments	5	1.26	0.25	0.20
G_1 - ($E_1E_2E_3$ x $C_1C_2C_3$)	1	0.09	0.09	0.07
G_2 - (E_1E_2 x E_3)	1	0.02	0.02	0.02
G_3 - (E_1 x E_2)	1	0.94	0.94	0.76
G_4 - (C_1 x C_2C_3)	1	0.07	0.07	0.06
G_5 - (C_2 x C_3)	1	0.14	0.14	0.11
S - Schools	3	4.40	1.47	1.19
S_1 - (Inner x Outer)	1	0.44	0.44	0.35
S_2 - (Within Inner)	1	0.25	0.25	0.20
S_3 - (Within Outer)	1	3.71	3.71	3.00
X - (Male x Female)	1	0.65	0.65	0.53
G_5 x S_1	1	9.39	9.39	7.60*
Error	15	18.54	1.24	
Total	48	92.68		

* 4.54 is the critical F value at the 0.05 level of significance for 1 and 15 df; 3.29 for 3 and 15 df; and 2.90 for 5 and 15 df.

TABLE D.5

MEAN SCORES FOR VEBI - SECTION C

	Schools		Treatment Conditions E_1	E_2	E_3	C_1	C_2	C_3
OUTER	Charlotte H.S.	Male	0.22	1.17	0.38	0.14	0.43	0.43
		Female	0.86	0.89	0.00	0.14	0.60	0.71
	Marshall H.S.	Male	0.00	0.44	0.50	0.16	0.44	0.25
		Female	0.80	0.00	0.40	0.16	0.62	2.20
INNER	Madison H.S.	Male	0.33	0.25	1.00	0.62	3.00	0.25
		Female	0.57	0.86	2.43	0.67	1.86	0.00
	West H.S.	Male	1.66	1.83	0.00	0.28	1.16	0.33
		Female	0.86	1.00	0.00	0.09	0.12	0.17

TABLE D.6

ANALYSIS OF VARIANCE FOR

VEBI-SECTION C; MAIN EFFECTS

AND SIGNIFICANT INTERACTIONS

Source of Variation	Degrees of Freedom	Sums of Squares	Mean-Square	F*
G - Treatments	5	2.54	0.51	2.25
G_1 - ($E_1E_2E_3$ x $C_1C_2C_3$)	1	0.05	0.05	0.24
G_2 - (E_1E_2 x E_3)	1	0.11	0.11	0.50
G_3 - (E_1 x E_2)	1	0.08	0.08	0.36
G_4 - (C_1 x C_2C_3)	1	1.35	1.35	5.96*
G_5 - (C_2 x C_3)	1	0.95	0.95	4.18
S - Schools	3	1.93	0.64	2.84
S_1 - (Inner x Outer)	1	1.14	1.14	5.04*
S_2 - (Within Inner)	1	0.78	0.78	3.47
S_3 - (Within Outer)	1	0.00	0.00	0.00
X - (Male x Female)	1	0.01	0.01	0.05
G_5 x S_1	1	2.97	2.97	13.11*
Error	15	3.40	0.23	
Total	48	21.68		

* 4.54 is the critical F value at the 0.05 level of significance for 1 and 15 df; 3.29 for 3 and 15 df; and 2.90 for 5 and 15 df.

TABLE D.7

MEAN SCORES FOR VEBI - SECTION D

	Schools		Treatment Conditions E_1	E_2	E_3	C_1	C_2	C_3
OUTER	Charlotte H.S.	Male	0.77	1.33	0.75	0.71	0.57	1.00
		Female	0.29	0.89	0.33	0.43	0.80	1.57
	Marshall H.S.	Male	0.75	0.67	0.50	0.83	2.22	1.12
		Female	0.20	0.00	0.80	0.16	0.75	0.00
INNER	Madison H.S.	Male	1.00	0.75	0.57	1.12	2.00	0.37
		Female	0.71	0.28	1.14	0.33	3.86	0.33
	West H.S.	Male	1.00	2.83	0.43	0.43	2.16	0.78
		Female	0.71	1.80	1.00	1.09	0.75	0.83

TABLE D.8

ANALYSIS OF VARIANCE FOR

VEBI-SECTION D; MAIN EFFECTS

AND SIGNIFICANT INTERACTIONS

Source of Variation	Degrees of Freedom	Sums of Squares	Mean-Square	F*
G - Treatments	5	6.06	1.21	4.02*
G_1 - ($E_1E_2E_3$ x $C_1C_2C_3$)	1	0.46	0.46	1.53
G_2 - (E_1E_2 x E_3)	1	0.18	0.18	0.60
G_3 - (E_1 x E_2)	1	0.60	0.60	2.01
G_4 - (C_1 x C_2C_3)	1	1.65	1.65	5.48*
G_5 - (C_2 x C_3)	1	3.16	3.16	10.46*
S - Schools	3	1.79	0.60	1.97
S_1 - (Inner x Outer)	1	1.62	1.62	5.38*
S_2 - (Within Inner)	1	0.07	0.07	0.25
S_3 - (Within Outer)	1	0.08	0.08	0.29
X - (Male x Female)	1	0.66	0.66	2.17
G_5 x S_1	1	2.11	2.11	6.99*
G_3 x S_2	1	1.62	1.62	5.36*
Error	15	4.53	0.30	
Total	48	24.74		

* 4.54 is the critical F value at the 0.05 level of significance for 1 and 15 df; 3.29 for 3 and 15 df; and 2.90 for 5 and 15 df.

TABLE D.9

MEAN SCORES FOR TURN-IN 1

	Schools		Treatment Conditions E_1	E_2	E_3	C_1	C_2	C_3
OUTER	Charlotte H.S.	Male	0.00	0.00	0.00	0.28	0.00	0.28
		Female	0.43	0.67	0.33	0.28	0.00	0.86
	Marshall H.S.	Male	0.00	0.00	0.00	0.50	0.22	0.00
		Female	0.00	0.00	0.10	0.00	0.63	0.00
INNER	Madison H.S.	Male	0.00	0.87	0.00	0.50	0.33	0.50
		Female	0.43	1.00	0.28	0.33	0.14	0.67
	West H.S.	Male	0.17	0.00	0.14	0.00	0.33	0.78
		Female	0.86	0.20	0.28	0.27	0.25	0.50

TABLE D.10

ANALYSIS OF VARIANCE FOR

TURN-IN 1; MAIN EFFECTS

AND SIGNIFICANT INTERACTIONS

Source of Variation	Degrees of Freedom	Sums of Squares	Mean-Square	F*
G - Treatments	5	0.44	0.09	2.43
G_1 - ($E_1E_2E_3$ x $C_1C_2C_3$)	1	0.07	0.07	2.04
G_2 - (E_1E_2 x E_3)	1	0.12	0.12	3.21
G_3 - (E_1 x E_2)	1	0.05	0.05	1.24
G_4 - (C_1 x C_2C_3)	1	0.03	0.03	0.78
G_5 - (C_2 x C_3)	1	0.18	0.18	4.89*
S - Schools	3	0.56	0.19	5.12*
S_1 - (Inner x Outer)	1	0.38	0.38	10.31*
S_2 - (Within Inner)	1	0.07	0.07	1.84
S_3 - (Within Outer)	1	0.12	0.12	3.22
X - (Male x Female)	1	0.27	0.27	7.44*
G_3 x S_2	1	0.64	0.64	17.65*
G_3 x X^2	1	0.16	0.16	4.57*
G_1 x X	1	0.21	0.21	5.81*
Error	15	0.55	0.04	
Total	48	3.89		

* 4.54 is the critical F value at the 0.05 level of significance for 1 and 15 df; 3.29 for 3 and 15 df; and 2.90 for 5 and 15 df.

TABLE D.11

MEAN SCORES FOR TURN-IN 2

	Schools		Treatment Conditions E_1	E_2	E_3	C_1	C_2	C_3
OUTER	Charlotte H.S.	Male	0.00	0.00	0.12	0.43	0.00	0.43
		Female	0.43	0.11	0.33	0.00	0.10	0.86
	Marshall H.S.	Male	0.00	0.11	0.00	0.00	0.11	0.00
		Female	0.00	0.28	0.00	0.00	0.00	0.00
INNER	Madison H.S.	Male	0.00	0.25	0.14	0.50	0.67	0.12
		Female	0.14	0.28	0.28	0.33	0.00	0.00
	West H.S.	Male	0.17	0.17	0.14	0.00	0.33	0.56
		Female	0.28	0.20	0.28	0.18	0.25	0.67

TABLE D.12

ANALYSIS OF VARIANCE FOR

TURN-IN 2; MAIN EFFECTS

AND SIGNIFICANT INTERACTIONS

Source of Variation	Degrees of Freedom	Sums of Squares	Mean-Square	F*
G - Treatments	5	0.20	0.04	1.87
G_1 - ($E_1E_2E_3$ x $C_1C_2C_3$)	1	0.07	0.07	3.31
G_2 - (E_1E_2 x E_3)	1	0.01	0.00	0.02
G_3 - (E_1 x E_2)	1	0.01	0.01	0.43
G_4 - (C_1 x C_2C_3)	1	0.03	0.03	1.47
G_5 - (C_2 x C_3)	1	0.09	0.09	4.12
S - Schools	3	0.38	0.13	5.97*
S_1 - (Inner x Outer)	1	0.14	0.14	6.83*
S_2 - (Within Inner)	1	0.01	0.01	0.54
S_3 - (Within Outer)	1	0.22	0.22	10.54*
X - (Male x Female)	1	0.01	0.01	0.55
G_1 x X	1	0.11	0.11	5.09*
Error	15	0.32	0.02	
Total	48	2.08		

* 4.54 is the critical F value at the 0.05 level of significance for 1 and 15 df; 3.29 for 3 and 15 df; and 2.90 for 5 and 15 df.

TABLE D.13

MEAN SCORES FOR SRS 1 -

ATTITUDE DURING SESSION 1

	Schools		Treatment Conditions E_1	E_2	E_3	C_1	C_2	C_3
OUTER	Charlotte H.S.	Male	1.00	0.83	0.87	1.00	0.71	0.71
		Female	1.00	1.00	0.83	0.71	0.90	1.00
	Marshall H.S.	Male	0.50	0.67	1.00	1.00	1.00	0.87
		Female	0.60	0.71	1.00	1.00	0.75	1.00
INNER	Madison H.S.	Male	0.67	0.87	0.86	1.00	1.00	1.00
		Female	0.87	1.00	1.00	1.00	0.86	1.00
	West H.S.	Male	1.00	0.67	0.86	0.71	0.83	0.89
		Female	1.00	0.80	0.86	0.82	0.75	0.83

TABLE D.14

ANALYSIS OF VARIANCE FOR

SRS 1 - ATTITUDE DURING SESSION 1;

MAIN EFFECTS AND SIGNIFICANT INTERACTIONS

Source of Variation	Degrees of Freedom	Sums of Squares	Mean-Square	F*
G - Treatments	5	0.07	0.01	1.44
G_1 - ($E_1E_2E_3$ x $C_1C_2C_3$)	1	0.02	0.02	1.53
G_2 - (E_1E_2 x E_3)	1	0.04	0.04	3.79
G_3 - (E_1 x E_2)	1	0.00	0.00	0.05
G_4 - (C_1 x C_2C_3)	1	0.00	0.00	0.29
G_5 - (C_2 x C_3)	1	0.02	0.02	1.51
S - Schools	3	0.06	0.02	2.11
S_1 - (Inner x Outer)	1	0.01	0.01	0.05
S_2 - (Within Inner)	1	0.05	0.05	4.98*
S_3 - (Within Outer)	1	0.01	0.01	0.85
X - (Male x Female)	1	0.01	0.01	1.20
G_3 x S_2	1	0.09	0.09	8.98*
Error	15	0.15	0.01	
Total	48	0.84		

* 4.54 is the critical F value at the 0.05 level of significance for 1 and 15 df; 3.29 for 3 and 15 df; and 2.90 for 5 and 15 df.

TABLE D.15

MEAN SCORES FOR SRS 2A -

DEGREE OF INTEREST IN MATERIALS

	Schools		Treatment Conditions E_1	E_2	E_3	C_1	C_2	C_3
OUTER	Charlotte H.S.	Male	2.66	2.16	2.63	3.00	2.29	1.86
		Female	2.43	2.55	2.33	2.14	2.20	1.86
	Marshall H.S.	Male	2.00	2.22	2.25	2.33	2.67	2.25
		Female	2.80	1.86	2.60	2.50	3.12	1.60
INNER	Madison H.S.	Male	2.67	2.13	2.43	2.63	2.00	2.13
		Female	2.14	1.86	2.71	1.67	2.14	2.00
	West H.S.	Male	1.67	2.33	2.57	2.43	2.33	2.00
		Female	2.71	2.40	2.43	2.00	2.87	1.83

Scores ranged on a four point scale from 1 for very interested to 4 for not at all interested.

TABLE D.16

ANALYSIS OF VARIANCE FOR

SRS 2A - DEGREE OF INTEREST IN MATERIALS;

MAIN EFFECTS AND SIGNIFICANT INTERACTIONS

Source of Variation	Degrees of Freedom	Sums of Squares	Mean-Square	F*
G - Treatments	5	1.68	0.34	3.43*
G_1 - ($E_1E_2E_3$ x $C_1C_2C_3$)	1	0.15	0.15	1.54
G_2 - (E_1E_2 x E_3)	1	0.23	0.23	2.32
G_3 - (E_1 x E_2)	1	0.15	0.15	1.57
G_4 - (C_1 x C_2C_3)	1	0.11	0.11	1.07
G_5 - (C_2 x C_3)	1	1.05	1.05	10.65*
S - Schools	3	0.15	0.05	0.05
S_1 - (Inner x Outer)	1	0.10	0.10	1.06
S_2 - (Within Inner)	1	0.05	0.05	0.48
S_3 - (Within Outer)	1	0.00	0.00	0.00
X - (Male x Female)	1	0.02	0.02	0.17
Error	15	1.47	0.09	
Total	48	5.94		

* 4.54 is the critical F value at the 0.05 level of significance for 1 and 15 df; 3.29 for 3 and 15 df; and 2.90 for 5 and 15 df.

TABLE D.17

MEAN SCORES FOR SRS 2B -

OPINION OF TREATMENT MATERIALS

	Schools		Treatment Conditions E_1	E_2	E_3	C_1	C_2	C_3
OUTER	Charlotte H.S.	Male	3.11	2.66	2.25	2.71	2.00	2.43
		Female	2.57	2.67	2.50	2.28	2.10	1.86
	Marshall H.S.	Male	2.75	2.78	2.25	2.17	2.78	2.50
		Female	3.80	2.14	2.50	2.28	2.62	1.60
INNER	Madison H.S.	Male	2.00	1.75	2.57	2.75	2.00	1.75
		Female	2.57	2.71	2.57	2.00	2.57	1.00
	West H.S.	Male	2.33	2.67	2.86	2.28	2.33	2.33
		Female	2.43	2.40	2.00	2.27	2.75	1.50

Scores ranged on a five point scale from 1 for excellent to 5 for horrible.

TABLE D.18

ANALYSIS OF VARIANCE FOR

FOR SRS 2B - OPINION OF TREATMENT MATERIALS;

MAIN EFFECTS AND SIGNIFICANT INTERACTIONS

Source of Variation	Degrees of Freedom	Sums of Squares	Mean-Square	F*
G - Treatments	5	2.97	0.59	4.41*
G_1 - ($E_1E_2E_3$ x $C_1C_2C_3$)	1	1.33	1.33	9.86*
G_2 - (E_1E_2 x E_3)	1	0.11	0.11	0.85
G_3 - (E_1 x E_2)	1	0.20	0.20	1.47
G_4 - (C_1 x C_2C_3)	1	0.24	0.24	1.75
G_5 - (C_2 x C_3)	1	1.09	1.09	8.12*
S - Schools	3	0.70	0.23	1.74
S_1 - (Inner x Outer)	1	0.50	0.50	3.75
S_2 - (Within Inner)	1	0.15	0.15	1.13
S_3 - (Within Outer)	1	0.04	0.04	0.33
X - (Male x Female)	1	0.11	0.11	0.85
G_5 x X	1	0.99	0.99	7.36*
Error	15	2.02	0.13	
Total	48	9.59		

* 4.54 is the critical F value at the 0.05 level of significance for 1 and 15 df; 3.29 for 3 and 15 df; and 2.90 for 5 and 15 df.

TABLE D.19

MEAN SCORES FOR SRS 2C - DEGREE OF PROBABLE EXPLORATION STIMULATED BY TREATMENT MATERIALS

	Schools		Treatment Conditions E_1	E_2	E_3	C_1	C_2	C_3
OUTER	Charlotte H.S.	Male	3.00	2.16	2.50	2.71	2.86	2.86
		Female	1.57	2.89	3.33	1.57	2.90	1.86
	Marshall H.S.	Male	3.00	2.44	2.75	2.33	3.44	2.37
		Female	3.00	1.86	2.50	2.83	3.37	1.80
INNER	Madison H.S.	Male	2.33	2.50	2.43	2.87	2.00	2.25
		Female	2.14	1.71	1.57	1.67	2.14	2.33
	West H.S.	Male	2.33	2.83	2.43	2.43	2.33	2.44
		Female	2.29	1.11	2.71	2.27	2.63	2.17

Scores ranged on a five point scale from 1 for a lot to 5 for not at all.

TABLE D.20

ANALYSIS OF VARIANCE FOR SRS 2C - DEGREE OF PROBABLE EXPLORATION STIMULATED BY TREATMENT MATERIALS MAIN EFFECTS AND SIGNIFICANT INTERACTIONS

Source of Variation	Degrees of Freedom	Sums of Squares	Mean-Square	F*
G - Treatments	5	1.46	0.29	1.04
G_1 - ($E_1E_2E_3$ x $C_1C_2C_3$)	1	0.02	0.02	0.08
G_2 - (E_1E_2 x E_3)	1	0.22	0.22	0.80
G_3 - (E_1 x E_2)	1	0.29	0.29	1.04
G_4 - (C_1 x C_2C_3)	1	0.12	0.12	0.42
G_5 - (C_2 x C_3)	1	0.81	0.81	2.86
S - Schools	3	1.59	0.53	1.89
S_1 - (Inner x Outer)	1	1.33	1.33	4.72*
S_2 - (Within Inner)	1	0.17	0.17	0.61
S_3 - (Within Outer)	1	0.09	0.09	0.32
X - (Male x Female)	1	1.13	1.13	4.02
Error	15	4.22	0.28	
Total	48	12.03		

* 4.54 is the critical F value at the 0.05 level of significance for 1 and 15 df; 3.29 for 3 and 15 df; and 2.90 for 5 and 15 df.

TABLE D.21

MEAN DIFFERENCE SCORES FOR JIL A - NUMBER OF COMPUTER JOBS LISTED

	Schools		Treatment Conditions E_1	E_2	E_3	C_1	C_2	C_3
OUTER	Charlotte H.S.	Male	0.00	0.00	0.00	0.00	0.00	0.14
		Female	-0.14	0.00	0.00	-0.14	0.00	0.14
	Marshall H.S.	Male	0.00	0.00	0.00	0.00	0.00	0.00
		Female	0.00	0.00	0.00	0.00	0.00	0.00
INNER	Madison H.S.	Male	0.00	0.25	0.14	0.00	0.00	-0.25
		Female	0.00	0.00	0.00	0.00	0.14	0.33
	West H.S.	Male	0.00	0.00	0.14	0.00	0.00	0.00
		Female	0.00	0.00	0.00	0.09	0.00	0.00

TABLE D.22

ANALYSIS OF VARIANCE FOR JIL A -

NUMBER OF COMPUTER JOBS LISTED;

MAIN EFFECTS AND SIGNIFICANT INTERACTIONS

Source of Variation	Degrees of Freedom	Sums of Squares	Mean-Square	F*
G - Treatments	5	0.02	0.01	0.43
G_1 - ($E_1E_2E_3$ x $C_1C_2C_3$)	1	0.00	0.00	0.01
G_2 - (E_1E_2 x E_3)	1	0.01	0.01	0.37
G_3 - (E_1 x E_2)	1	0.01	0.01	0.83
G_4 - (C_1 x C_2C_3)	1	0.01	0.01	0.65
G_5 - (C_2 x C_3)	1	0.00	0.00	0.26
S - Schools	3	0.02	0.01	0.60
S_1 - (Inner x Outer)	1	0.01	0.01	1.28
S_2 - (Within Inner)	1	0.01	0.01	0.52
S_3 - (Within Outer)	1	0.00	0.00	0.00
X - (Male x Female)	1	0.00	0.00	0.00
Error	15	0.17	0.01	
Total	48	0.36		

* 4.54 is the critical F value at the 0.05 level of significance for 1 and 15 df; 3.29 for 3 and 15 df; and 2.90 for 5 and 15 df.

TABLE D.23

MEAN DIFFERENCE SCORES FOR JIL B -

LEVEL OF EDUCATION REQUIRED BY JOB CHOICE

	Schools		Treatment Conditions E_1	E_2	E_3	C_1	C_2	C_3
OUTER	Charlotte H.S.	Male	0.44	0.50	-3.75	-0.43	0.00	0.71
		Female	0.86	0.22	0.50	-0.28	0.40	0.43
	Marshall H.S.	Male	0.50	0.78	-0.25	0.17	-0.33	-0.12
		Female	-1.20	-0.43	1.60	0.67	0.63	0.00
INNER	Madison H.S.	Male	2.67	0.62	-0.28	0.37	0.67	0.25
		Female	-0.28	-1.00	0.57	0.33	0.43	0.67
	West H.S.	Male	1.83	-0.83	-0.28	-0.14	0.17	0.59
		Female	2.43	0.00	-0.43	0.45	-1.87	-0.17

TABLE D.24

ANALYSIS OF VARIANCE FOR DIFFERENCE SCORES

ON JIL B - LEVEL OF EDUCATION REQUIRED BY JOB CHOICE

MAIN EFFECTS AND SIGNIFICANT INTERACTIONS

Source of Variation	Degrees of Freedom	Sums of Squares	Mean-Square	F*
G - Treatments	5	6.64	1.33	1.71
G_1 - ($E_1E_2E_3$ x $C_1C_2C_3$)	1	0.03	0.03	0.04
G_2 - (E_1E_2 x E_3)	1	2.88	2.88	3.71
G_3 - (E_1 x E_2)	1	3.41	3.41	4.40
G_4 - (C_1 x C_2C_3)	1	0.00	0.00	0.00
G_5 - (C_2 x C_3)	1	0.32	0.32	0.41
S - Schools	3	1.24	0.41	0.53
S_1 - (Inner x Outer)	1	0.55	0.55	0.71
S_2 - (Within Inner)	1	0.45	0.45	0.57
S_3 - (Within Outer)	1	0.24	0.24	0.31
X - (Male x Female)	1	0.01	0.01	0.01
G_3 x S_1	1	4.34	4.34	5.59*
G_2 x X	1	7.93	7.93	10.22*
Error	15	11.64	0.78	
Total	48	46.01		

* 4.54 is the critical F value at the 0.05 level of significance for 1 and 15 df; 3.29 for 3 and 15 df; and 2.90 for 5 and 15 df.