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VOCATIONAL PROBLEM-SOLVING EXPERIENCES FOR STIMULATING CAREER EXPLORATION AND INTEREST, PHASE II. MID-PROJECT REPORT, DECEMBER 1, 1966-APRIL 30, 1967.

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NEW OCCUPATIONAL CAREER KITS ARE DESIGNED TO PROVIDE REALISTIC OCCUPATIONAL EXPERIENCES IN THE FIELDS OF APPLIANCE REPAIR, LAW ENFORCEMENT WORK, AND ELECTRONICS. THE WORK INVOLVED IN DEVELOPING AND TESTING EACH KIT IS DELINEATED. THE TWO MAJOR EXPERIMENTS DESIGNED TO TEST HYPOTHESES ABOUT THE OPTIMAL USE OF THESE KITS ARE DESCRIBED. THE FIRST EXPERIMENT INVESTIGATES THE EFFECT OF OCCUPATIONAL SIMULATION MATERIALS OF THREE LEVELS OF DIFFICULTY ON STUDENTS OF THREE LEVELS OF ABILITY AND DIFFERING OCCUPATIONAL INTERESTS. FOR THE SECOND EXPERIMENT, SPECIFIC WAYS WERE TESTED OF TAILORING OCCUPATIONAL PROBLEM-SOLVING MATERIALS TO THE PREFERENCES AND INTERESTS OF THE INDIVIDUALS. (AUTHOR/PS)

Mid-Project Report

1 December 1966 - 30 April 1967

Vocational Problem-Solving Experiences for Stimulating Career Exploration and Interest: Phase II

Contract OEG 4-7-070111-2890

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In accordance with the original proposal work has been progressing in developing and testing three new occupational career kits plus conducting two major experiments. The three new career kits are designed to provide realistic occupational experiences in the fields of appliance repair, law enforcement work, and electronics. The work involved in developing and testing these three kits will be described first, followed by descriptions of work on the major experiments which are designed to test hypotheses about the optimal use of the kits.

I. Developing and Testing New Occupational Simulation Kits

A. Appliance Serviceman Kit

The first month's work on the project revolved around learning as much as possible about the occupation of Appliance Serviceman. Various employers of such people were contacted to find servicemen who would be available for study and consultation. Published sources such as the Dictionary of Occupational Titles and the Occupational Outlook Handbook were read to get a picture of the job duties of a serviceman, how his occupation related to other occupations, and to learn information on the working conditions, qualifications and future outlook of the job. After some considerable search of the places in this area where servicemen are employed, two servicemen were found to serve as consultants.

During November, our main goal was to focus on the actual behaviors utilized by appliance servicemen on the job. From the study we hoped to generate possible representative aspects of the job which could be explored in kit form suitable for individual use in a school setting. A good deal of time was spent in actual observation of the appliance serviceman on his job to assess behaviorally what he does and to get some impression of the importance of each duty relative to the total job. By the end of November, several broad areas of needed knowledge or skill had been defined and several ideas for problems to be solved by the student in the kit from each area of knowledge or skill had been outlined.

The first drafts of the text materials to be included in the kit were then prepared. It was necessary to prepare the kit so that it could be entirely self-administered. The kit had to anticipate questions and procedural problems as well as give the student all the background knowledge necessary in language the target population could understand. The text was divided up into small segments for each page so as not to inundate anyone with written material.

As 1966 drew to a close, activities were geared to producing several job problems for use in the kit and to testing various ways of having the student solve the problems. The problem had to be presented in a

way similar to the way it would be encountered on the job. Cost limitations and feasibility were criteria considered.

The plan was for the student to carry out the main steps in the total repair job on an electric steam iron. One step in this process, of course, is that of actually diagnosing the electrical fault in the iron's circuit. For a time we produced and experimented with tentative versions of a kit with an actual iron, or at least the electrical portion of it, in the kit itself. In the course of working out various possible presentations and approaches, it was learned that the use of aluminum foil simulated circuits would be less expensive to produce, more practical to use due to weight and bulk, more attractive, and better subject to our control and manipulation so as to minimize irrelevant details.

Simultaneously the tentative drafts of text for the booklets were being revised to bring the vocabulary in line with that of our target population.

By mid-February a copy of the tentative final version was ready to be given to high school students on a pilot study basis to find any remaining flaws in wording, vocabulary, and problem presentation. Using both students considered quite bright and those of our eventual target population, we received feedback on the basis of which further revisions of specific pages and sections in the booklet were made. From the rather bright students we learned of errors and faults which only they would have the ability to verbalize clearly. From the other students we identified needed vocabulary revisions and directions which were not concrete and detailed enough. A month was used for such individual testing, revision and refinement.

The site for the experimental study was a comprehensive high school just south of San Francisco. Non-college bound or "general" track students in 11th grade English classes and one core social studies-English class were selected as the sample for testing. All girls in the classes selected were administered control booklets which were general career kits developed earlier in Phase I. They dealt generally with exploring career opportunity and assessing one's own interests and abilities. The boys in each class were randomly assigned to either the control booklet or the experimental Appliance Serviceman booklet. There were a total of 29 experimental boys and 27 control boys.

Five criterion measures were obtained. (1) At the end of all booklets, the student was given a page with three addresses to which he could write for more information on the occupation of Appliance Serviceman. An opportunity was given on the answer form to copy down the addresses. The number of students who wrote down one or more of these addresses was tallied for control and experimental groups. (2) Each student

received a post card which he could mail for further information on careers. The number of students signing and mailing the post card within a specified criterion period was tallied for each group. (3) On a separate criterion sheet at the back of the booklet, each student was told that if he wished, he could speak with his school counselor on career planning and gain more information on careers in this manner. The number of students signing their names and thus indicating their desire to see their counselor on the matter was tallied. (4) Students were informed that booklets much like the one they had worked on today, were available for specific occupations. The available kit titles were then listed below with opportunity for the student to sign his name by each one he wished to use. Thus, the number of students signing their names by one or more booklets was tallied. (5) Actual copies of each available kit were placed in the school guidance office and opportunities provided for their use by the students during the remainder of the week in which the booklets were administered. A count was made of the number of students from each group who actually made arrangements to come in and use at least one of the booklets.

The study was carried out during the latter part of April and at present the data thus collected is being prepared for computer analysis.

B. Police Officer Kit

The first step was the making of a job analysis for the occupation of Police Officer. Part of the necessary information was acquired by reading police officer training manuals and by reading two books: Patrol Precedure and Traffic Accident Investigator's Manual. Thomas F. Bell, Assistant Chief of the Stanford University Police Department was also interviewed concerning the duties of a police officer.

The next step was to formulate problems that would fit into the general format of the problem-solving booklets. Possible ideas and tentative arrangements were discussed and revised in the weekly staff conferences. Assistant Chief Bell also was consulted. After the general plan of the book had been established, the specific content of the book was developed. In the process of developing this specific content three institutions were contacted in order to obtain pictures to use in the booklet: Palo Alto Police Department, Palo Alto, California; Santa Clara County Sheriff's Office, San Jose, California; and San Jose College Department of Criminology, San Jose, California.

Next was the actual writing of the booklet. Tentative drafts were made, discussed, and revised after staff conferences and occasional interviews with Assistant Chief Bell. By 15 January 1967 a complete rough draft of the booklet had been prepared.

The booklet was then tested by having high school students read the booklet and go through the operations involved. Six students were used. Three of the students were from Gunn High School, Palo Alto, California, and three were from Homestead High School, Sunnyvale, California.

The general procedure for these sessions was to have the student read the booklet and do the work under the observation of the author. The student was given as much time as he needed to complete the booklet, and he was instructed to ask questions whenever he felt the booklet was unclear. When each student had finished the booklet, about 20 minutes were spent discussing the booklet and the student's impressions of it.

Following each one of these test administrations of the booklet, revisions were made in order to clarify ambiguous parts or to reduce the time needed for completing the booklet. By 28 February 1967 the booklet was ready for the final inspection. After further check, the booklet was printed by the Photo-Reproduction Department of Stanford University.

After a review of the literature and some discussion, it was decided to design a study to answer the following question: Within grades 9-12, at which grade level will students be most responsive to an occupational simulation designed to stimulate information seeking?

In order to answer the question, it was necessary to find a high school from which could be drawn a sample that would meet certain conditions: (1) students of comparable ability from each grade level, (2) replication across classes within grade level, (3) independence and randomness of sample. To meet the requirements listed above the sample was drawn in the following manner: All students in the sample were in the same "track." For this study the track used was the middle track of a three track arrangement. (These students were generally headed for a junior college education.) The students were drawn from classes in a subject which was the same for all grade levels and which was required for all grade levels. The subject was English. A pool of all of the middle track English classes was formed for each grade level. From each pool two classes were randomly selected, and the experimental and control treatments were randomly assigned within each of the two classes for each grade level.

Having specified the requirements for the sample, the next step was to find a high school in which the study could be done. Miss Betsy Haley, Director of Guidance for the Fremont Union High School District was contacted and as a result of her suggestion, Cupertino High School, Cupertino, California, was then approached. The arrangements for doing the study were made through George Fernandez, Principal of the school.

The administrative details were worked out after the sampling procedure had been specified and after the school had been chosen. Due to the arrangement of classes at Cupertino High School, it was possible to complete the administration of all treatments in one day. The experimental treatment consisted of the administration of the Police Officer Kit. In order to maximize the difference between treatment and control, a programed text in statistics was chosen as the control treatment. The actual administration of the study was done by taking over the involved classes for one class period. The experimenter made a short introductory statement, and then the control and experimental treatments were randomly assigned to the boys and then the girls. The students were given most of the class period to work on the booklets. With about 7 minutes left in the period, the experimenter stopped those who had not already finished, and asked all students to score their answer forms and read the criterion sheets which were inserted in the booklets inside the back cover. If they wished, they could respond to any or all of the items on the insert and thereby indicate their interest in looking for more occupational information. During the succeeding week the students also had the opportunity to check out other problem-solving kits, send in a post card requesting occupational information, and use the school vocational files. The responses to the above measures were used collectively as the criterion measure. When the students had finished reading and responding to the criterion sheets, all materials were collected.

The treatments were administered on 10 April 1967. One week subsequently was allowed for collecting the criterion measures. The data have been collected but the analysis has not yet been completed.

C. Electronic Technician Kit

Printed materials were searched and persons contacted to determine the range of problems an electronic technician deals with on the job.

This led to a conceptualization of several representative problems which might be suitable for the Electronic Technician Kit. We developed prototype equipment and written materials regarding each of the following problems: (1) selecting appropriate resistors for a circuit which included a miniature electric motor; (2) finding a faulty part on a transistorized element; (3) using a 500 milliamp meter to test for correct amounts of voltage, current and resistance in a variety of circuits.

A month was spent in testing and analysis of the prototype units. Finally, we selected the meter and circuit problems to serve as the focal point of the Electronic Technician Kit.

In January we developed further the written materials for the initial part of the Kit. This included basic electrical principles necessary for students to work with even the simplest electronic problems.

Continued development of the circuit problems included: (1) selection of appropriate resistors for each problem; (2) sequential arrangement of problems leading up to the final troubleshooting problem.

We tested the Kit with a small sample of non-college bound high school students. Then, we made corrections, additions and deletions based on feedback from these students. After a number of volunteers had worked with a prototype of the booklet a new copy was made and given to two electronic technicians for their technical approval and advice. Their suggestions were adopted.

We prepared the Kit for printing and constructed the meter units. Also, we selected treatment and subject variables for the pilot experiment to be conducted in April. We decided to test both boys and girls on the Kit with the meter unit; the Kit with and without preparatory materials; and the Kit with a simulated meter unit. Also, there would be a no-treatment control group.

In April we administered the pilot experiment in Crestmoor High School, San Bruno, California. We limited data collection to 5 days following the experiment.

Data analysis will be the next step.

II. Two Major Experiments

A. Experiment I: Effect of Difficulty Level of Occupational Simulation Kits

The purpose of this phase of the research is to investigate the effect of occupational simulation materials of three levels of difficulty on students of three levels of ability and differing initial occupational interests. The following progress has been made during this reporting period.

1. Preparation of materials

The problem-solving booklets in sales, x-ray technology and medical laboratory technology were revised so that each could be presented at three levels of difficulty. The booklets were administered to 300 high school tenth graders to establish the success criteria for each level of difficulty.

Occupational fact sheets were prepared to provide information on the three occupations involved in the study.

Information tests were constructed covering the material presented in each of the three occupational fact sheets.

2. Selection of Subjects

Arrangements were made with the East Side Union High School District of San Jose, California to use students from Andrew Hill High School as subjects for this experiment. The community served by this school is predominantly working and lower middle class families. Twenty-five percent of the student population is Mexican-American.

The subject pool for this experiment included all the boys from the junior class and an equal number of boys randomly selected from the freshman class making a total of 412 subjects.

3. Administration of the Experiment

Three weeks prior to the administration of the booklets, all subjects were given the Holland Vocational Preference Inventory.

Grade point averages for the preceding semester's work in school were computed for each subject. The subjects were divided into three ability groups based on grade point average.

Job simulation booklets of each of three levels of difficulty and career information booklets (used as a control treatment) were randomly distributed to subjects during their regular social studies period. The booklets were distributed in a manner which assured that equal numbers of subjects at each grade and ability levels would be given booklets of each occupation and difficulty.

Subjects were given 50 minutes to complete the booklets and compute their scores.

4. Collection of Criterion Measures

Three kinds of criterion measures were taken.

a. Information Seeking

After the administration of the booklets, subjects were given the following opportunities to obtain further occupational information:

1. An opportunity to work on other booklets of a similar nature.

2. An opportunity to ask questions to be answered by a special vocational counselor.

3. An opportunity to obtain special materials from the school library.

4. An opportunity to obtain vocational information from a school counselor.

5. An opportunity to receive occupational information in the mail.

A record was made of each student taking advantage of these opportunities to obtain further occupational information.

b. Interest in Learning More about Occupations

A rating scale measuring interest in learning more about various occupations including the three in this study was administered to all subjects one week following the treatment.

c. Knowledge of Occupational Facts

Occupational fact sheets on sales, x-ray technology, and medical laboratory technology were distributed to all subjects six days after the booklets were administered. One day following the distribution of the fact sheets, each subject was given a test on the material covered in the fact sheet corresponding to the booklet that he had used. Tests were scored for each subject in the experiment.

5. Preparation of Data

The data from the experiment will be coded and key punched for statistical analysis on the IBM 7090 computer.

B. Experiment II: Determining More Effective Ways of Using Occupational Simulation Materials

1. Objectives

Specific ways of tailoring occupational problem-solving materials to the preferences and interests of individuals were tested:

1. To determine the effect of giving students their choice of problem-solving materials.

2. To determine the effect of adding specific questions for students to explore after problem-solving.

3. To determine the effect of assuring students an opportunity to make use of the information to be sought.

2. Experimental Design

a. Subjects

One hundred sixty subjects, males and females, from the 11th grade level were used. They represented the entire non-college preparatory group for this grade level at Sequoia High School, Redwood City, California.

b. Hypotheses

Three hypotheses were tested:

1. Students who are given their first choices of occupational problem-solving materials will respond more positively on criterion measures than students not given their first choices.

2. Students who are given specific questions comparing the merits of the two occupations they study will respond more positively on the criterion measures than will subjects given general questions about occupations.

3. Students who are notified that they will be asked to discuss their reactions and findings following problem solving will respond more positively on the criterion measures than will subjects who are not notified.

c. Method

Subjects were given a list of the seven occupational kits: accounting, appliance serviceman, electronic technician, medical technology, police work, sales work, and X-ray technology. They were asked to indicate the two occupations which they most wanted to try. They were told that it would not be possible for everyone to have his first choices because of the limited number of kits available, but that every student would have an equal chance of receiving his first choices. Eighty students were chosen at random to receive their two first choices (the choice group). The remaining 80 students were assigned randomly to a group which did not receive their choices (the no-choice group). For each student in the choice group who selected a given pair of occupations, a matched student from the no-choice group received the two identical occupational kits provided that he had not indicated either of them as his first two choices. For example, if student X in the choice group selected medical technology and electronic technician as his first two choices, all students in the no-choice group who did not select either medical technology or electronic technician

as one of their first choices were listed. One student was selected at random from among them for pairing with student X and received the medical technology and electronic technician kits. Matching was also done on the basis of sex.

After students completed their two occupational kits, half of the choice group and half of the no-choice group received specific detailed questions comparing the two occupations. The other half received general questions. Examples of specific questions comparing two occupations were as follows: "What is the average monthly starting salary of a medical technologist?" "What is the average hourly starting salary of an electronic technician?" "What is the average monthly salary after five years for each occupation?" "Which of the two occupations pays more at the beginning?" "Which of the two pays more after five years?" Examples of the more general questions were the following: "What is the nature of training required for entry into the occupation?" "Are the salary levels satisfactory?" "Are the activities of the type that you would enjoy?"

Half of the students who received each type of question were informed that at a specific place and at a specific time one week in the future they would be asked to describe their reactions to the occupational kits and any information they may have found during the criterion period. In fact, all subjects received such an inquiry, but only half of them were told of it in advance. The purpose here is to evaluate the effect of establishing an expectancy that someone is interested in learning about the student's reactions and the results of his explorations.

At the end of the second problem-solving session, all students were given packets of materials which contained a great deal of occupational information relevant to the careers they studied. Also in the packets were the orienting questions and an interview request slip for those wishing to discuss vocational topics. A qualified counselor was made available to receive and respond to all interview requests.

Criterion data will be collected during May.