TITLE THE ACADEMIC BACKGROUNDS O

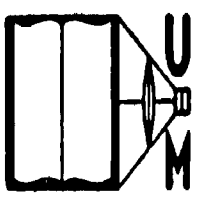
AGRICULTURAL EXTENSION WORKE

AS RELATED TO SELECTED ASPECTS
OF WORK ADJUSTMENT

AUTHOR A. CONRAD POSZ

UNIVERSITY MICH. STATE COLL. DATE 195

DEGREE Ed. D. PUBLICATION NO. 3672



THE ACADEMIC BACKGROUNDS OF AGRICULTURAL EXTENSION WORKERS AS RELATED TO SELECTED ASPECTS OF WORK ADJUSTMENT

By

A. Conrad Posz

A DISSERTATION

Submitted to the School of Graduate Studies of Michigan State College of Agriculture and Applied Science in partial fulfillment of the requirements for the degree of

DOCTOR OF EDUCATION

Department of Education

1 9 5 2

ACKNOWLEDGMENTS

The author wishes to express his gratitude to the chairman of his guidance committee, Dr. Walter F. Johnson, under whose kind guidance and inspiration this study was undertaken. Special acknowledgment is also due to the other guidance committee members, Professors Leonard J. Luker, Cecil V. Millard, and Paul D. Bagwell for their willing suggestions during the investigation and their helpful comments on the completed manuscript. This investigator is also indebted to Professor Kenneth G. Nelson, technical advisor to the study, for his constant supervision, constructive suggestions, and unlimited patience. Special thanks are due to Dr. Clifford E. Erickson who was chairman of the author's guidance committee for four years. At the time Dr. Erickson was appointed to the position of Dean of the Basic College, he relinquished his chairmanship of the author's committee. Sincere thanks are also due to Mr. Robert A. Jackson and Dr. William D. Baten for their advice relative to the statistical phases of the study.

The writer deeply appreciates the assistance provided by the members of the over-all research committee who supervised the various aspects of the research project: Dr. Charles R. Hoffer, Dr. Duane L. Gibson, Mr. Paul A. Miller, Mr. John T. Stone, Mr. Joseph L. Locke, Dr. Rowland R. Pierson, Mr. Robert O. Hatton and Mr. Donald C. Curry. Credit is also due to Mr. Claude Courtway, Jr.

and Mr. Norman E. Drayton who participated in the accomplishment of the objectives of the research project.

This writer extends his sincere thanks to Dr. Paul L. Dressel, Chairman of the Michigan State College Board of Examiners, to Mr. Lyle B. Leisenring, Michigan State College Recorder, and to Mr. Robert S. Linton, Michigan State College Registrar, for their permission to use the student records and their assistance in obtaining and interpreting those records.

The investigator appreciates the cooperation of the County Agents and 4-H Club Agents who provided the assistance necessary to obtain much of the data of this study. Thanks are also due to the extension administrators who participated in the rating of the agents included in this study.

Acknowledgment is also due the Office of Naval Research of the United States Navy and the United States Department of Agriculture for the financial aid provided for this study.

Credit is also due to my wife, Marie Fjelstad Posz, for her inspiration, assistance and unlimited patience.

A. Conrad Posz

candidate for the degree of

Doctor of Education

Final examination, February 11, 1952, 2:00 P.M., Institute of Counseling, Testing and Guidance Conference Room

Dissertation: The Academic Backgrounds of Agricultural Extension Workers as Related to Selected Aspects of Work Adjustment

Outline of Studies

Major subject: Education, Guidance and Counseling
Cognate subject: Speech

Biographical Items

Born, September 11, 1920, Plainview, Minnesota

Undergraduate Studies, Winona State Teachers College, Winona, Minnesota, 1939-1944.

Graduate Studies, State University of Iowa, 1944-1946, Michigan State College, 1946-1952

Experience: Radio Announcer and Engineer, Radio Station KWNO, Winona, Minnesota, 1943-1944, Graduate Teaching Assistant, State University of Iowa, 1944-1946, Instructor in Written and Spoken English, Michigan State College, 1946-1952

Member of Speech Association of America, National Vocational Guidance Association, National Society for the Study of Communication, American Association of University Professors

TABLE OF CONTENTS

CHAPTER Page

LIST OF TABLES

TABLE Page

TABLE Page

TABLE Page

TABLE Page

TABLE Page

TABLE Page

TABLE Page

TABLE Page

CHAPTER I

THE PROBLEM AND DEFINITION OF TERMS USED

The Problem

High school teachers, college teachers and guidance workers are constantly concerned with counseling young men and women relative to appropriate fields of endeavor. Personnel workers and employers are concerned with selecting personnel that will prove satisfactory on the job, once hired. This guidance and selection is frequently based upon such factors as academic aptitude test scores, college grades, college majors and the number of credit hours taken in said major. There is increasing concern, however, on the part of educators, counselors, consulting psychologists and personnel managers about whether these predictors are actually related to vocational adjustment.

The professional literature abounds in studies which attempt to determine the relationship between academic aptitude test scores and high school grades on the one hand and college success or success in other training programs on the other hand. However, there is a dearth of studies which attempt to determine the relationship between such academic factors as aptitude test scores, college grades, college majors, and so forth, and criteria of vocational adjustment. Nevertheless, in recent years, there has been a trend toward depending less upon hunch as to the vocational significance of prognostic measures and more upon research designed to demonstrate the actual relationship

between these measures and criteria of vocational adjustment. This trend has brought forth some commendable researches, but there still exist many gaps in the over-all pattern of research necessary in this area. The present research is designed to fill one of those gaps.

Statement of the problem. Early in 1950, a research committee was appointed by the Michigan Extension Service to study the differential characteristics of successful extension workers. As the first stage in this over-all research project, the committee decided to analyze data available on the County Agricultural Agents and County 4-H Club Agents presently employed in Michigan with respect to the relationship between certain of their personal characteristics and various criteria of their work adjustment. The personal factors selected for study were: (1) biographical information to be obtained by interview and questionnaire, (2) measured personal and social adjustment, (3) vocational interests, and (4) selected aspects of the agents' academic backgrounds. The criteria of work adjustment selected for study were: (1) rated work effectiveness and (2) measured job satisfaction.

The present investigation is one phase of the over-all research described above. Its purpose is two-fold: first, to ascertain the academic status and backgrounds of the County Agricultural Agents and County 4-H Club Agents presently employed by the Michigan Extension Service, and second, to study the relationship between selected aspects of their academic backgrounds and the two selected criteria of vocational adjustment, rated work effectiveness and measured job satisfaction. The aspects of the agents' academic backgrounds selected for this study were: scores on the American Council on Education Psychological Examination (an academic

aptitude test), college grades, college majors, and the number of hours the agents took in technical agriculture.

More specifically, this research is an attempt to determine:

1. The academic status and background of the County Agricultural Agents and County 4-H Club Agents who are presently employed by the Michigan Extension Service.

2. The relationship between the agents' scores on the American Council on Education Psychological Examination and their rated success.

3. The relationship between the agents' scores on the American Council on Education Psychological Examination and their measured job satisfaction.

4. The relationship between the agents' all-college grade-point averages* and their rated success.

5. The relationship between the agents' all-college grade-point averages and their measured job satisfaction.

6. The relationship between the agents' technical grade-point averages** and their rated success.

7. The relationship between the agents' technical grade-point averages and their measured job satisfaction.

8. The relationship between the agents' college majors and their rated success.

---

* All-college grade-point average refers to the numerical average computed on all grades received in college. A description of method used in computing grade-point averages is presented in Chapter IV.

** Computed on agriculture courses at the Junior and Senior level in college.

9. The relationship between the agents' college majors and their measured job satisfaction.

10. The relationship between the number of credit hours of technical agriculture taken by the agents and their rated success.

11. The relationship between the number of credit hours of technical agriculture taken by the agents and their measured job satisfaction.

Importance of the problem. Educators, counselors, consulting psychologists, and personnel managers find themselves in the position of having to estimate future growth (including learning), success, or adjustment of individuals. Such prediction is necessary in order to provide information which may be used in educational and vocational guidance and in personnel selection and placement. In order to provide a factual basis for prognosis of this kind, numerous investigators have studied the predictive efficiency of aptitude tests and grades received in school. However, most of these studies have concentrated on the problem of predicting college grades or success in other training programs. Such researches have provided useful information for those individuals who are concerned with educational guidance. They have also provided information which is valuable in vocational guidance, because in professions such as medicine, law, dentistry, etc., a person cannot succeed without first succeeding in professional school or college. In such cases, success in training is the first step in vocational success. Nevertheless it must be recognized that success in training is not synonymous with success on the job, and relatively few of the studies reported in the professional literature concern themselves with the relationship between prognostic measures and strictly vocational criteria.

In this dearth of information relative to the vocational significance of prognostic measures lies one of the major limitations of using aptitude tests and grades in vocational guidance, selection or placement. In most cases, no one knows just what the relationship of these tests and grades is to future success and satisfaction in various fields. This is significant, when it is recognized that a prognostic measure is most valuable in vocational guidance and personnel selection when it can be expressed in terms of its vocational significance. In addition, it is preferable to have this vocational significance stated in terms of the particular occupation in question. Therein lies a major reason for undertaking the present investigation.

This investigator was unable to locate any studies which attempted to determine the relationship between academic aptitude test scores, college grades, college majors or the number of hours taken in technical agriculture courses and vocational adjustment in extension work. Researches were discovered which studied the relationship between several of the measures and success on the job in other occupations such as sales work, teaching, clerical work, office management, and so forth. However, none of the occupations studied could be classified as sufficiently similar to the jobs of the County Agricultural Agent or the County 4-H Club Agent to justify the use of the research findings in the selection of, or guidance of, persons interested in entering extension work.

This lack of evidence has caused considerable concern on the part of some administrators of the Michigan Extension Service. The Michigan Extension Service, confronted by a higher than desired rate of turnover

and certain indications of dissatisfaction, is desirous of refining the process presently used to select these county extension workers.

Examination of the personnel records revealed that the rate of turnover during the years 1948, 1949, and 1950 exceeded 15 per cent among County Agricultural Agents and County 4-H Club Agents. In studying the records of these two groups of agents separately, it was discovered that the rate of turnover was higher among 4-H Club Agents than among County Agricultural Agents. Part of this difference can be explained by the fact that most of the County Agents had first worked as 4-H Club Agents and probably would not have been offered an appointment to the job of County Agent unless they had succeeded as 4-H Club Agents. In addition, if they had been dissatisfied with extension work, they probably would not have accepted the appointments. The higher per cent of men leaving the job of 4-H Club Agent might also be explained by the fact that most men who are appointed to the staff of the Michigan Extension Service are appointed as 4-H Club Agents. Thus, the job of being a 4-H Club Agent is their first contact with extension work. It would seem logical that those men who were not capable of performing the necessary jobs, or those men who found that they did not like extension work, would quit or be released within the first several years while they were still employed as 4-H Club Agents.

This high rate of turnover has lead to the opinion on the part of some extension administrators that many of the young men who are desirous of becoming extension agents and even many of those who are selected to be agents are not qualified to succeed in this work. These same administrators expressed the opinion in research committee meetings that many of

the applicants would probably not be satisfied with the work once they were selected. Either incompetence or dissatisfaction might lead to unsatisfactory performance and hence dismissal or voluntary resigning from the job.

The above personnel problems indicated the need for improved guidance and selection techniques. Basic to such improvement is research designed to investigate the relationship between available prognostic measures and at least two criteria of agents' work adjustment, work effectiveness and job satisfaction.

Origin of the study. The need for improved guidance and selection techniques in the Michigan Cooperative Extension Service resulted in the initiation of a research project designed to study the various ramifications of the problem. The first step in the initiation of the project was the appointing of a committee to supervise the study. The members of the committee were selected on the basis of their research ability, their willingness to work on such a project, and their familiarity with extension work. The committee, selected early in 1950, consisted of representatives from the Michigan Extension Service, the Department of Sociology and Anthropology, the Counseling Center, the Institute of Guidance, Counseling and Testing, and the Department of Written and Spoken English. John Stone, specialist in Extension Training at Michigan State College, was appointed as chairman of the committee. The chief function of the committee has been to plan the general research project.

During the first few weekly meetings, plans were laid for an over-all investigation that would involve not only a study of the County Agricultural Agents and County 4-H Club Agents employed in Michigan, but additional

studies involving cooperation with several other state Extension Services and including analysis of data on men who would be employed by the Michigan Extension Service in future years.

As the first stage in this over-all project, plans were made to analyze data available on the County Agricultural Agents and County 4-H Club Agents now employed in Michigan in an attempt to determine the relationship between certain of their personal characteristics and various criteria of their work adjustment. The final project design included two primary criteria of vocational adjustment, work effectiveness and job satisfaction. The decision was made that work effectiveness should be determined by supervisory ratings, and job satisfaction should be measured by administering an adaptation of the Hoppock Job Satisfaction Blank.[1] The personal factors selected for study were: (a) biographical data to be obtained by interview and questionnaire, including an analysis of the agent's self-concept and his concept of his job; (b) measured personal and social adjustment; (c) vocational interests; and (d) selected aspects of his academic background.

The design of the first stage of the over-all study was to analyze the relationship between the above personal factors and the two criteria of work adjustment. The members of the planning committee undertook separate phases of the study. This investigator, a member of the planning committee, undertook the study of the relationship between selected factors of the agents' academic backgrounds and the two measures of vocational

---

[1] Robert Hoppock, Job Satisfaction, New York: Harper and Brothers, 1935, 303 pp.

adjustment. After several meetings with the planning committee, it was determined that the following aspects of academic background should be studied: academic aptitude, all-college grade-point average, number of credit hours taken in technical agriculture, technical agriculture grade-point average, and college major.

Limitations of the study. (1) Work effectiveness in this study has been determined by the ratings of the Michigan Extension Service administrators. It must be recognized that this method of determining work effectiveness or success on the job involves three crucial assumptions: (a) that the raters can be and are objective in their ratings; (b) that the raters are honest in their rating; and (c) that the raters are capable of measuring relative degrees of work effectiveness in the men they are rating. Steps were taken to insure objectivity, but it was not possible to determine the degree of objectivity that was obtained. The fact that the administrators who did the rating worked closely with the men who were being rated and were impressed by the importance of the research helped to substantiate the second and third assumptions.

(2) It was necessary to assume the validity of the self-descriptive statements made by the agents on the attitude questionnaire. No means were available to determine whether or not the expressed attitudes were the real attitudes of the individuals.

(3) The sample used in this study does not include any of the agents who left the Extension Service before May 1, 1951. It would be desirable to study these agents, with information available as to why they left the job. Neither does the sample include the men who were

rejected in the selection process. Consequently, the sample used in this study is a select group which has been influenced by the following selective factors: (a) some men were not selected for the job because the extension administrators decided that they were not qualified to perform the necessary functions; (b) some men were released from the job because they were doing unsatisfactory work; (c) some men left the job because they were dissatisfied with the type of work they were required to do; (d) some of the men were promoted to the jobs of extension administrators, subject-matter specialists, and state leaders; and (e) some men left the job because they found work situations which were more desirable either because of working conditions or remuneration. Thus, selective factors have been operating to select the group at both ends of the continuum.

(4) In the present study, it was decided that it would be better to study the County Agricultural Agents and the 4-H Club Agents separately, because of the differences in the jobs and the differences in the ages of the two groups of men. Dividing the total group of agents into two groups resulted in two samples, one of 81 County Agricultural Agents and one of 48 County 4-H Club Agents. These samples are smaller than desired for such a study. However, these samples can be considered of adequate size for the population being studied, namely, Michigan County Agricultural Agents and County 4-H Club Agents.

(5) The results revealed by the present investigation will be applicable in Michigan only. This limitation emphasizes the need for cross-validation on data available in other states before the results from such

investigations will be valid for extension workers generally.

(6) In order to compare academic aptitude with vocational adjustment, American Council on Education Psychological Examination scores were obtained for as many agents as possible. This aptitude test is the one given to all entering freshmen at Michigan State College. It was possible to obtain scores for 26 County Agricultural Agents and 36 County 4-H Club Agents. It was impossible to obtain test scores for the rest of the agents for the following reasons:

(a) Because there were no test records available in the record files of the Board of Examiners that pre-dated 1934, it was impossible to obtain test scores on those men who entered Michigan State College prior to that date.

(b) Some agents who attended Michigan State College had entered after 1934 but had not taken the entrance examinations.

(c) Some agents attended institutions other than Michigan State College and had no test records available at those institutions.

The statistical analysis undertaken to determine the seriousness of this limitation is presented in Chapter VII.

(7) It was not possible to obtain all-college grade-point averages for three County Agricultural Agents who did not attend college. It was also impossible to obtain technical grade-point averages for seven County Agricultural Agents (three of whom did not attend college and four of whom did not take any technical agriculture courses) and for five County 4-H Club Agents who did not take any technical agriculture courses.

(8) Because only decile ranks were available on the American Council on Education Psychological Examination for many of the agents,

it was not possible to use the raw scores. This resulted in the loss of a certain amount of accuracy.

Definition of Terms

These terms will be used throughout the study with the accompanying meanings.

Work adjustment. In this study, the term "work adjustment" will be used to refer to both criterion measures, work effectiveness (success on the job) and job satisfaction.

Work effectiveness. The term "work effectiveness" and the term "success on the job" will be used synonymously in this report. Work effectiveness was determined by ratings given by seven extension administrators. The term is used to refer to the success with which the agents performed their job, as prescribed by various organizations and agencies which have a part in determining those tasks assigned to the agents. It also includes personal and inter-group relations which they have established with the groups and individuals with whom they work.

Job satisfaction. This term refers to the individual's attitude toward his job, as measured by the Job Satisfaction Questionnaire.

Job Satisfaction Questionnaire. The adaptation of the Hoppock Job Satisfaction Blank that was used in this study is called the Job Satisfaction Questionnaire.[2]

County Agent. "County Agent" is the name usually applied to the

---

[2] A copy of the Job Satisfaction Questionnaire is included in the Appendix.

County Agricultural Agent, the Associate County Agricultural Agent, or the Assistant County Agricultural Agent. The County Agent is usually the person responsible for the administration and coordination of the county extension program. The duties of the County Agent are presented in Chapter II.

4-H Club Agent. "4-H Club Agent" is the name usually applied to the County 4-H Club Agent. The 4-H Club Agent is concerned primarily with directing the youth program of the extension organization. The duties of the 4-H Club Agent are presented in Chapter II.

Extension Administrator. In this study, the term "Extension Administrator" refers to the group of administrators who participated in the rating of the agents. The term includes the Director of the Extension Service, the Assistant Director of the Extension Service, the State Agricultural Extension Leader, the four District Supervisors (one of whom is also the Specialist in Extension Training), and the State 4-H Club Leader.

ACE. The abbreviation, ACE, will refer to the American Council on Education Psychological Examination for College Freshmen, the academic aptitude test used in this study.

Technical agriculture. Courses in agriculture at Michigan State College that are offered at the Junior and Senior level are frequently referred to as courses in technical agriculture. At Michigan State College, these courses are numbered in the 300 and 400 series. Courses offered at the Freshman and Sophomore level are not included because they are introductory and general courses.

Technical grade-point average. The term "technical grade-point average," or the abbreviation, "TGPA," refers to the grade-point average that the individuals have in their courses in technical agriculture. The procedures used for computing grade-point averages are described in Chapter IV.

All-college grade-point average. The abbreviation "GPA," or the term "all-college grade-point average," refers to the grade-point average of the individuals in all of their college courses. The procedures used for computing grade-point averages are described in Chapter IV.

Hours in technical agriculture. This term refers to the number of credits or credit hours that an individual has taken in technical agriculture.

Organization

The following general plan was followed in this study:

I. Chapter I is concerned with a statement of the problem, the importance of the problem, the origin of the study, the limitations of the study, a definition of terms, and the organization of the study.

II. Chapter II is a description of the job of the County Agent and the 4-H Club Agent.

III. Chapter III contains a review of the professional literature related to this investigation. This review is divided into two main areas: (1) literature related to the prognostic measures; and (2) studies predicting success on the job and job satisfaction from college grades and aptitude tests.

IV. Chapter IV is concerned with the procedures used in the study

and a description of the sample studied.

V. Chapter V presents a description of the criterion measures used in this investigation and the procedures by which they were obtained.

VI. Chapter VI contains a description of the academic status and the academic backgrounds of the agents.

VII. Chapters VII and VIII are concerned with the presentation and analysis of the data relative to the relationship between the selected factors of academic background and work adjustment.

VIII. Chapter IX contains a summary of the investigations which were made in this study, conclusions that were drawn as a result of the study, and some implications for further research.

CHAPTER II

THE WORK SITUATION OF THE AGENTS

The Research Committee engaged in a detailed job analysis, but for the purposes of this phase of the over-all study, only the main aspects of the work situation are presented. It is necessary to understand the job situation of these agents in order to interpret the results of the study in terms of related fields of endeavor.

In order to understand the job of county extension agents, it is first necessary to examine the organization of the Michigan Cooperative Extension Service.

The State Organization

The State Board of Agriculture, an elected governing body, formulates the broad policy under which Michigan State College, including the Michigan Cooperative Extension Service, operates. The chief administrative officer is the College President who is appointed by the Board of Agriculture. Under the College President are the Deans of the twelve schools that make up Michigan State College. One of these Deans is the Dean of the School of Agriculture who has the responsibility of administering all resident teaching, research, and extension work carried on in the field of agriculture. Under this Dean are Assistant Deans who are charged with the responsibility of conducting these three phases of the work. One of these Deans is the Director of the Michigan Cooperative Extension Service.

The Director of the Extension Service is the administrator in charge of all extension work in the state. In this capacity, he is in charge of determining the plan of the organization, defining the responsibilities, hiring and training personnel, determining policies, supervising activities and funds, reporting to the public the work of the Extension Service, and maintaining satisfactory relationships between extension service personnel and other groups and organizations.

The Assistant Director of Extension is in charge of general administration and finance. He also assists the Director in discharging his many responsibilities and acts for him in his absence.

The state is divided into four supervisory districts. A District Extension Supervisor is administratively in charge of each of these districts. There is a single line of authority from the Office of the Director through the District Supervisors to the County Extension Offices. In addition to their responsibilities as administrators, these District Supervisors serve as liaison officers between the county staffs and the state leaders. They supervise in-service training, public relations and all reports of extension activities within their districts. They are also responsible for assisting the county workers in carrying out well-balanced and coordinated extension programs, by seeing that adequate financial support is always available, that adequate personnel is employed to fit the actual needs of the various counties or combinations of counties in the districts, and that it is possible to secure and utilize such basic information as will be valuable in perfecting a sound extension program. In addition to the above responsibilities,

the rating of the work effectiveness of each employee and the recommending of salary adjustments is in the hands of the District Supervisors.

In contrast to administration, the actual extension program is the responsibility of the State Leaders of 4-H Club Extension Work, Home Demonstration Work, and Agriculture Extension Work. These State Leaders and their assistants serve as representatives of the Director of Extension on all matters pertaining to the development of the extension program. They work closely with department heads of various college departments and with the Subject Matter Specialists. The District Extension Supervisors actually serve in dual roles, inasmuch as they act as Assistant State Leaders in Agriculture Extension in addition to their administrative responsibilities. The Assistant State Leaders in Home Demonstration Work supervise and work closely with the County Home Demonstration Agents on teaching methods and program planning. Assistant State Leaders in Boys' and Girls' Club Work carry out similar activities in relation to the 4-H Club program and serve as subject matter specialists on 4-H Club work.

Another group of extension employees who fit into the work situation of the County Agents and the 4-H Club Agents are the Extension Specialists. This group of employees are trained in various fields of subject matter. Their job is to assist the County Agents in building a sound program in their particular fields of emphasis, and also to initiate and coordinate state-wide programs in their particular areas of emphasis. In addition, they are on call to teach rural people in meetings and other events arranged for by the county staff members. Their particular

job is to act as the connecting link between the research workers and the county staff or the people in the job of disseminating the latest scientific information, and in the job of referring problems requiring scientific investigation to the appropriate research workers.

In the preceding paragraphs, an attempt has been made to describe the extension administrators and other workers who work closely with the County Agent and the 4-H Club Agent, in order to highlight the work situation in which these county workers find themselves. In the following paragraphs the county organization of the Michigan Extension Service will be described.

The County Organization

In the state of Michigan there are 75 County Extension Offices in the 83 counties of the state. In some cases, several counties share the services of county workers. There is a County Agent in each of the 75 County Extension Offices. In 30 of the counties there are three agents: a County Agent, a Home Demonstration Agent, and a 4-H Club Agent. Nine other counties have four or more extension workers, and the rest of the counties have less than three county workers each. In sparsely settled parts of the state, where there is only one full time extension agent, the County Agent is that one worker. He is assisted in these counties by the District 4-H Club Agent and the District Home Demonstration Agent.

In each county, one of the extension workers is charged with the responsibility of administering and coordinating all of the extension activities in the county. He is designated as the County Administrative

Officer. Usually it is the County Agent who is given this responsibility. In addition to this administrative responsibility, however, the County Agent also serves as an educator and field worker.

There are three broad phases of the extension program in Michigan. These are: Agricultural Extension Work, Home Demonstration Work, and boys' and girls' 4-H Club Work. However, since the scope of this study is limited to two types of extension workers (the County Agricultural Agent and the 4-H Club Agent), the following paragraphs have been limited to the activities of these two types of extension workers.

In each county, the responsibility for carrying on an extension program in the field of agricultural education is that of the County Agent. In counties that are served by all three types of extension workers, his primary responsibility is to the farmers and the agricultural interests of the area. However, because he is a public servant, he is actually responsible to all of the people of the county and his services are available to both rural and urban groups. In some counties the County Agent is the only extension worker and in these counties he must carry on all phases of the extension program.

The County 4-H Club Agent, or 4-H Club Agent as he is frequently called, is charged with the responsibility of developing and coordinating an effective 4-H Club program. This year there are approximately 60,000 different boys and girls enrolled in 4-H Club work in Michigan. To reach this many young people with only 50 to 60 4-H Club Agents, approximately 7,200 volunteer local leaders are utilized in making the 4-H Club program in Michigan a success. A large portion of each 4-H

Club Agent's time is devoted to helping and training these local leaders who do much of the actual leading and teaching of the boys and girls. Through this phase of the extension program, boys and girls carry on projects related to the farm, home and community.

County extension workers receive their salaries from Michigan State College and are considered as faculty members with all of the rights and privileges of the academic staff at the College. However, before a county extension worker may be employed, he must be approved by the County Board of Supervisors which is the local governing body of each county in Michigan. Because the County Board are elected officers of the people and because this group appropriates funds for the operation of the local extension office, they have considerable influence upon the work of all county extension agents. The County Board passes judgment on the work of the county extension agents each year when they make the annual appropriation for the county extension budget. Appropriations from the County Board of Supervisors in Michigan account for practically 18 per cent of the total extension budget in the state. It is usually the responsibility of the County Administrator to work closely with this Board and report annually to them on the progress of the work of all county extension agents.

In addition to their cooperation with the County Board of Supervisors, the county extension agents work with a great many other organizations within the county. Foremost among these groups are the Extension Advisory groups. Each county has a 4-H Club Advisory Council, a Home Economics Advisory Council, and an Agricultural Advisory Council. In most counties the County 4-H Club Advisory Council is composed of a

group of from ten to fifteen local 4-H Club Leaders elected to this council by the other local leaders. The Home Economics Council is made up of the officers of the home economics clubs of the county. The major agricultural organizations of the county select representatives to serve on the County Agricultural Advisory Council. Each of these three county councils sends representatives to make up district and state councils. Then, at the county level, members from these three councils serve as the County Extension Service Advisory Board in each county. This County Extension Service Advisory Board assists the county agents in the planning of the over-all county extension programs. The details are then worked out by the individual agents and the advisory councils.

In the preceding paragraphs, an attempt has been made to summarize the organizational pattern and the general policies of the Michigan Cooperative Extension Service. However, this information presents only a partial picture of the job of the county extension agents. In the following paragraphs the specific activities of the county agents will be considered in greater detail.

The Responsibilities of County Extension Agents

Although the various county agents have somewhat different responsibilities, their work is in many ways similar. The Michigan Extension Service has compiled an abbreviated list of the various responsibilities of an agent:

1. He represents Michigan State College and the United States Department of Agriculture in the county.
2. Studies the resources, people, and agriculture of the county to determine its problems that can be solved through education and cooperative effort.

3. Plans and works with local people on their problems bringing science and knowledge to bear on a solution.

4. Develops an effective supporting organization of local volunteer leaders to help carry out the extension program to the boys, girls, men and women of the county.

5. Develops rural leadership by providing opportunities for others to lead and giving them training as leaders.

6. Maintains a public office where rural people and others can get information. From the successful extension office a constant flow of information is disseminated to all people of the county through newspaper articles, radio stories, and circular and personal letters. Efficient office management together with care in handling public funds is an important part of the job.

7. Arranges for meetings, demonstrations, exhibits, tours, etc. Arranges for help of college specialists whose aim is to bolster the county program.

8. Arranges for leader training meetings, achievement days, fairs, banquets, etc., for the recognition of rural volunteer leaders upon whom the county extension program is built.

9. The county worker must constantly evaluate his work. He prepares a monthly and annual report of his activities.

10. The job is that of a teacher above all else; and it is what he does to help people help themselves that will achieve the greatest success and satisfaction for the Extension worker. [1]

These, then, are the general responsibilities of a county extension agent. Some of the details of the agent's job are described in the following paragraphs.

In general, the tasks, activities and techniques used or carried on by extension workers fall into three classes: (1) teaching, (2) continual study and evaluation of the county, the program and the professional

---

[1] John T. Stone, Michigan Cooperative Extension Service: Organization, Development, Policies, East Lansing, Michigan: Michigan State College, 1950, pp. 7-8.

activities of the agent, and (3) operational functions in connection with local, state and national extension divisions.

Teaching. McNelly[2] states that investigation shows that approximately 80 per cent of the agent's time is directed toward teaching. This teaching program frequently takes the form of a series of "projects." At any one time he may have anywhere from two to a dozen "projects" in all stages of development. In addition to these projects, there may be a number of events that are not assignable to any particular project, but that may involve some teaching. These events may represent only the end product of the teaching results. Such events are typified by achievement days, fairs and exhibits.

Teaching methods and techniques. The specific methods and techniques used by extension agents vary from county to county, from agent to agent, but are generally tailored to fit the audience, which may be an individual, an organization or simply an aggregate of people.

Contact with individuals may be in the form of office calls, farm or home visits, phone conversations or correspondence. The meeting may be a planned trip or an impromptu meeting on the street corner. The learning that is accomplished may be the focus of the meeting or it may be incidental to it. Either the client or the agent may initiate the meeting. It is estimated, and various studies confirm this estimate, that about 40 per cent of all teaching done by the agent is done in individual contacts.

---

[2] C. L. McNelly, A Study of the County Agent Work Pattern, St. Paul: University of Minnesota Press, 1949, p. 3.

Slightly less than half of the agent's time is spent in a group teaching situation.[3] Many of these group meetings are sponsored by extension workers, such as 4-H Clubs, home demonstration clubs, and dairy improvement associations. Others are not extension sponsored, and the agent may be cooperating for the public relations value it may have, or because the ends or goals of the group can be shared by extension.

Mass contact is also valuable in some aspects of the agent's job. Mass media are used to help keep "Extension" in the minds of the public. Newspaper articles and columns, and radio talks or programs are the most frequently used media of mass communication. Other mass contacts are made through: general meetings, clinics, films and slides, exhibits, rallies and achievement days, posters, and handbills.

Recruiting and training local leaders. The number and quality of the local leaders that an agent is able to enlist and the amount of training that he can give to these leaders determines to a large degree the amount of work an agent can accomplish in his county. Perhaps the most important advantage of involving local leaders in the program is based upon the assumption that the diffusion of a new idea may be facilitated when a member of the local group acts as an intermediary. In addition, however, the agent can then use the special skills or the influence of these individuals in carrying on the extension program.

Maintaining a network of inter-group relations. More and more agents are concentrating their efforts toward the maintenance of a

---

[3] Ibid., p. 3.

network of inter-group relationships in order to permit the "community" to function in solving its own problems. This effort has resulted in seed improvement associations, self-supporting soil testing laboratories, dairy herd improvement associations, artificial insemination cooperatives, community markets, library, health and recreation facilities, and the like. The success of such efforts have led extension administrators to put more stress upon this area of operation.

Maintaining a public office. Studying the county agent's work pattern, McNelly[4] found that 47 per cent of the agent's time is spent in the office. Each agent is expected to maintain an office, generally in the county seat. The local extension office usually includes the County Agent, the 4-H Club Agent, and the Home Demonstration Agent, plus the clerical staff. This county office serves as the point of contact with individual farmers seeking aid, with representatives of local groups, and with state and federal supervisors and specialists. The library of the technical agriculture information and extension bulletins, the files, the telephone, and dictation or secretarial facilities are all integral parts of a well-run office. Much of the individual teaching is accomplished in the office setting, mostly in the form of office calls.

Survey and evaluation. A crucial factor in the development of the extension program and in the professional development of the agent is a process of constant evaluation, study, and survey. A county worker must

---

[4] Ibid., p. 3.

study the topological and cultural limitations of the county. The agricultural practice that the agent is to suggest must be geared to the climate, soils, drainage, market, and transportation facilities of the county as well as to the socio-economic level at which the people are presently operating.

By constant review of the change in practice, which is in turn related to the technical and socio-economic potential of the county, it is possible to begin to evaluate the program as well as the professional growth of the agent. An ineffective program may be due to a faulty estimate of the needs of a county, emphasis upon inappropriate projects, or faulty teaching methods. Still more basically, it might be due to an incorrect view of the agricultural potential or the social structure of the county.

Operational functions. Approximately one-fifth of the time that an agent spends on the job is devoted to administrative detail involved in integrating local, state and national extension divisions. This kind of detail includes the following:

1. Writing of narrative and statistical reports to be used at both the state and national levels for evaluation of individual county programs and for compiling district, state and regional and national reports.

2. Periodic and special meetings with supervisors and specialists. This includes time spent in learning and supervisory conferences and in accompanying and arranging for specialist meetings with farmers. This kind of contact may be in the agent's office, at the College, or at district conferences held throughout the state.

3. Local administration of national agencies' programs such as land

use planning, soil conservation, drought relief, etc.

4. Administration of funds expended at the county level.

The preceding paragraphs have been concerned with a description of the main functions of an extension worker's job and the detail which goes into them. Teaching, survey and evaluation of the agent, the program, and the professional status of the agent, and the operational details of accomplishing integration of a local, state and national program account for a majority of this activity.

Summary of Chapter II

In order to make the findings of this study more applicable to other fields of endeavor and to better understand the situation in which these agents work, Chapter II has analyzed the job situation of the County Agent and the 4-H Club Agent. The first part of the chapter is centered upon an examination of the Michigan Cooperative Extension Service. The line of authority in the job situation is from the State Board of Agriculture, to the President of Michigan State College, the Dean of the School of Agriculture, the Assistant Dean who is responsible as the Director of the Michigan Extension Service, and the District Supervisors. There is a single line of authority from the Office of the Director through the District Supervisors to the County Extension Offices. However, in addition to this line of authority, the County Board of each county has considerable influence upon the work of the county extension agents.

In contrast to administration, the actual extension program is the responsibility of the State Leaders of Extension, who are representatives

of the Director of Extension on all matters pertaining to the development of the extension program.

The County Agents and the 4-H Club Agents are employed by Michigan State College and enjoy the same privileges and rights that are enjoyed by the academic staff of the college. Their salaries are paid jointly by Michigan State College and the United States Department of Agriculture, while the funds for operating the extension program are provided jointly by Michigan State College and the counties in which the agents work.

While the duties of the County Agents and the 4-H Club Agents are similar in many respects, the County Agents are primarily concerned with the agricultural extension work in the counties, while the 4-H Club Agents are primarily concerned with the youth program of the Extension Service. The work of both of these types of extension workers falls into three broad classes: (1) teaching, (2) continual study and evaluation of the county, the program and the professional activities of the agent, and (3) operational functions in connection with local, state, and national extension divisions. Actually, the jobs of the County Agents and 4-H Club Agents involve heterogeneous activities, requiring that they be able to perform numerous roles in the course of carrying out the objectives of the Michigan Extension Service.

CHAPTER III

REVIEW OF THE LITERATURE

The literature on predicting college achievement, vocational prognosis, and job satisfaction is extensive. To review all of this literature would involve a great deal of time and space. Such a procedure has been made unnecessary because of the numerous reviews of literature available in these areas. The literature reviewed in this chapter has been limited to studies particularly relevant to this research project.

In order to cover the various aspects of this study, literature was reviewed in several main areas. First, it was felt necessary to review that literature related to the prognostic measures used in the study. The literature concerning the reliability of grades given by college instructors is examined along with some of the literature on the American Council on Education Psychological Examination. These two areas are considered in Part I. Part II of this chapter is concerned with research related to the prediction of vocational adjustment from intelligence or aptitude tests and from grades.

I. REVIEW OF THE LITERATURE CONCERNING THE AMERICAN COUNCIL ON EDUCATION PSYCHOLOGICAL EXAMINATION AND THE RELIABILITY OF INSTRUCTORS' GRADES

The American Council on Education Psychological Examination. The American Council on Education annually publishes a new form of its Psychological Examination for College Freshmen (two sample copies are included in the Appendix). L. L. and T. G. Thurstone of the University of Chicago have been responsible for the technical work on the examinations and for the constant revision of forms.[1] The examination has been used widely with college freshmen since 1924, and the American Council on Education annually publishes norms for these college freshmen. The fact that the test is designed for college freshmen and the norms are published in terms of college freshmen has discouraged the use of this test with other groups. This has proved to be a limiting factor in this study, inasmuch as it was not possible to administer the test to those men who had not taken the examination when they were freshmen in college. No tables were available to make possible the interpretation of scores made by college graduates or other men who have passed the chronological age of college freshmen. Studies by Barnes[2] and Hunter[3]

---

[1] Donald E. Super, Appraising Vocational Fitness, New York: Harper and Brothers, 1949, p. 114.

[2] M. W. Barnes, "Gains in the A. C. E. Psychological Examination During the Freshman-Sophomore Years," School and Society, 1943, Vol. 57, pp. 250-252.

[3] E. C. Hunter, "Changes in Scores of College Students on the A. C. E. Psychological Examination at Yearly Intervals," Journal of Educational Research, 1942, Vol. 36, pp. 284-291.

have demonstrated the need for caution in the use of the American Council on Education Psychological Examination (hereafter abbreviated ACE) scores for comparing adults with the normative group. As a result of this limitation, it was necessary to include only the scores of those men who had taken the ACE when they were entering college.

The editions of the ACE since 1938 have included a number-series section in addition to the sections contained in the earlier forms published prior to 1938. Although the number-series was added, the new forms of the ACE that are published each year are constructed so as to resemble earlier forms. Details and innovations are gradually added to the examination. This practice has a definite advantage, in that each new form is based upon extensive previous research. Since 1940 the scores on the number-series, arithmetic and figure analogies subtests have been combined to give a Q score or a quantitative subtotal; while a linguistic subtotal is obtained from the completion, same-opposite, and verbal analogies sections. These two subtotals have been derived from the ACE because research has indicated that there are possibly two kinds of aptitude related to achievement in school work and in vocations. Whether the Q and L scores on the ACE are true indications of these aptitudes, linguistic and numerical or quantitative, is open to question, however. Super[4] administered the ACE High School Edition to 123 high school juniors and seniors, along

---

[4] Super, op. cit., p. 118.

with three other tests: Nelson-Denny Reading Test, Minnesota Vocational Tests for Clerical Workers, and the Cooperative Survey Test in Mathematics. The results of this study indicated that the L scores are more closely related to reading ability than either the total score or the Q score. The L scores are as closely related to mathematics as are the Q scores. The L scores are more closely related to name-checking than are the Q scores, and there is little difference between the Q and L scores on number-checking.

Each year the ACE is revised and this new form is administered to 1,000 or more students who have taken the preceding form. These data are then used for tentative standardization. The final norms are then based on some 70,000 minimum number of students. Super reacts to the ACE in the statement:

> Studies have occasionally been made to determine the academic predictive value of the examination and to establish its reliability. The assumption is usually made, however, that since the new edition is anchored to the preceding editions and has similar norms it will be approximately as reliable and valid as they.[5]

More specifically, the reliability of the ACE tests has been very high. Thurstone and Thurstone[6] found that the 1938 College Edition had odd-even reliabilities of .95 for the total score, .95 for the L score and .87 for the Q score. One indication of the validity of an intelligence test is the carefulness of the method by which it is standardized.

---

[5] Ibid., pp. 116-117.

[6] L. L. Thurstone, T. G. Thurstone, and D. C. Adkins, "The 1938 Psychological Examination," Educational Record, 1939, Vol. 20, pp. 263-300.

This carefulness is exhibited in the correlations between subtests on the 1938 edition which range from .30 to .65 on subtests that try to measure relatively distinct components of intelligence.[7]

In summarizing his analysis of the ACE, Super further reports:

> This review of the A. C. E. Psychological Examination shows that it has been studied in most of the ways in which other tests have been tried, . . . There is probably more material concerning its educational significance than there is for any other single test. It is a reliable and valid test of scholastic aptitude or general intelligence at the college level.[8]

Although a great deal of literature is available related to the ACE, and although it is in widespread use, very little attempt has been made to validate the examination for vocational guidance and for personnel selection purposes. Some attempts have been made to compare total scores to success in various types of training, but there has been a scarcity of studies which have used strictly vocational criteria for validation purposes. There are several possible reasons for this dearth of investigations relating the ACE to vocational criteria. First, the ACE was designed and constructed for educational prognosis and most investigators have studied its validity for this purpose. Second, it is difficult to obtain satisfactory vocational criteria to be used for validation purposes.

The reliability of instructors' grades. In attempting to determine the relationship between grades and vocational criteria, it might

---

[7] Ibid.

[8] Super, op. cit., p. 123.

be worthwhile to examine some of the studies of the reliability of grades.

Borow[9] states that college grades are a result of a multiplicity of adjustment factors. These adjustment categories which affect college grades are: curricular adjustment, maturity of goals and level of aspiration; personal efficiency, planning and use of time; study skills and practices, mental health and personal relations (with faculty and associates). The effect of the last of these categories is a major factor in the unreliability of grades. What one instructor considers to be an appropriate personal relationship is considered by another to be inappropriate. In another study Bohan concludes that it is practically impossible to make comparisons of grades from one instructor to another. He also points out that at the University of Minnesota inconsistencies exist between colleges, departments, and courses.[10]

In classes where essay tests are used to determine part or all of student grades, the unreliability of grades increases. The unreliability of ratings on essay tests has been demonstrated in many studies. Hortog[11] found that scores on essay tests rated by various instructors using

---

[9] H. Borow, "The Measurement of Academic Adjustment," Journal of the American Association of Collegiate Registrars, 1947, Vol. 22, pp. 274-286.

[10] J. E. Bohan, "Students' Marks in College Courses," (Unpublished Ph.D. thesis, University of Minnesota, Minneapolis, 1926).

[11] P. Hortog and E. C. Rhodes, An Examination of Examinations, International Institute Examinations Inquiry, London: Macmillan and Co., Ltd., 1935.

their usual method of rating, varied widely. Brown[12] reported that essay-type tests in home economics were as difficult to score with any degree of accuracy. In this study twelve home economics teachers graded seven essay-type examinations of ninth grade students. The grades were assigned as percentages. The spread of grades given on the seven papers is as follows: Paper A; over 20 percentage points; Paper B, over 30 percentage points; C, over 40; D, over 60; E, over 40; F, over 45; G, over 55. In other words, there was little agreement as to the value of the papers.

One of the factors influencing grades on essay-type examinations is the handwriting or penmanship of the student. Sheppard[13] and James[14] reported positive relationship between the quality of the penmanship and the grade given to essay-type test papers that were identical in content.

Any investigator must recognize that grades have not been in the past and are still not completely reliable. Notwithstanding, these same unreliable grades are frequently used as prognostic measures. However, this study is not an attempt to establish the reliability of grades, but is, rather, an attempt to test the validity of the practice of using college grades as predictors of work adjustment.

---

[12] Clara M. Brown, Evaluation and Investigation in Home Economics, New York: F. S. Crofts and Company, 1941, p. 33.

[13] E. M. Sheppard, "The Effect of the Quality of Penmanship on Grades," Journal of Educational Research, 1929, Vol. 19, pp. 102-105.

[14] A. W. James, "The Effect of Handwriting on Grading," English Journal, 1927, Vol. 16, pp. 180-205.

II. PREDICTION STUDIES

The literature on prediction studies which has been reviewed has been selected for its relevancy to particular aspects of this study. An attempt to include all of the studies which have been made on prediction of vocational adjustment would involve a great deal of time and space and would, of necessity, include many studies that have no particular relevance to predicting work adjustment in extension work. Such a review would also necessitate including studies that use other prognostic measures than those included in this study. For these reasons, the prediction studies included in this chapter have been selected because they predict success or job satisfaction in occupations related to extension work from grades or aptitude test scores.

The work of the County Agent and the 4-H Club Agent is diversified, consisting of the following major roles: consultant, salesman, news reporter, radio broadcaster, public speaker, administrator, organizer, facilitator, public relations worker, student, teacher, office detailist, and judge.[15] Studies that could be located in the professional literature pertinent to any or all of these roles are reviewed for this study.

---

[15] John T. Stone, "A Classification of the Differential Occupational Roles Performed by County Agricultural Agents, the Tasks Associated With Each, and the Relative Amount of Time a Model Agent Spends Performing Them," (Unpublished mimeographed report on file in the office of the Michigan Extension Service, July, 1951).

A. Scholastic Aptitude Related to Vocational Adjustment

Intelligence or scholastic aptitude has been thought to affect vocational success in many different ways. Of special concern to this study is how it affects (1) success in training, (2) success on the job as indicated by various criteria ranging from supervisory ratings to earnings, and (3) satisfaction in one's work.

1. Studies relating scholastic aptitude to college grades. Innumerable studies have been reported in the professional literature relating intelligence test scores to grades in college. Academic prediction has been the sole purpose of some of these studies; others have used college grades as a criterion of vocational success because it is frequently much easier to obtain criteria of success in training than in the practice or pursuit of the vocation itself. Using grades in place of vocational criteria has been subjected to criticism. But the practice is partially justified in some studies by the fact that a person cannot succeed in medicine, law, dentistry, extension work, etc. without first succeeding in professional school or college. In such cases, success in training is the first step in vocational success.

A study conducted at Hunter College by Weintraub and Salley[16] analyzed the records of 1,064 freshmen. This study revealed that 24 per cent of the students in the lower half of the class on the ACE were dropped for poor scholarship during the four year program. Only 14 per

---

[16] R. G. Weintraub and R. E. Salley, "Graduation Prospects of an Entering Freshman," Journal of Educational Research, 1945, Vol. 39, pp. 116-126.

cent of the upper half of the class were dropped for poor scholarship.

Hartson[17] and Hartson and Sprow[18] report studies conducted at Oberlin on students who were given the Otis Self-Administering Tests of Mental Ability. It was found that 65 per cent of the freshmen who had Otis I. Q.'s less than 110 failed academically.

Various summaries of prediction literature have been made available to investigators. Douglass[19] summarized prediction studies in 1931. He reported a wide range of correlation coefficients, with a median correlation coefficient of .45 between intelligence test scores and college grades. Kinney[20] reviewed the literature in 1932 and found a median correlation coefficient of .445. Segal[21] reviewed the literature in 1934. His review included one hundred studies of the relationship between intelligence and college grades and found a median correlation coefficient of .44. Thurstone and Thurstone have annual reports

---

[17] L. D. Hartson, "Influence of Level of Motivation on the Validity of Tests," Educational and Psychological Measurement, 1945, Vol. 5, pp. 273-283.

[18] L. D. Hartson, and A. J. Sprow, "Value of Intelligence Quotients Obtained in Secondary Schools for Predicting College Scholarship," Educational and Psychological Measurement, 1941, Vol. 1, pp. 387-398.

[19] H. R. Douglass, The Relation of High School Preparation and Certain Other Factors to Academic Success at the University of Oregon, University of Oregon Publications, Educational Series 3, No. 1, 1931.

[20] L. B. Kinney, A Summary of the Literature on the Use of Intelligence Tests in Colleges and Universities, University of Minnesota Committee on Educational Research, Minneapolis: University of Minnesota Press, 1932.

[21] D. Segal, Prediction of Success in College, United States Office of Education Bulletin, No. 75, Washington, D. C.: Government Printing Office, 1934.

of the ACE available for persons interested in studying the relationship between the ACE and college grades. A few of the studies included in these reports have been included in the following table.

Peiser[22] reviewed 121 studies relating intelligence tests to success in college. He found that the correlations ranged from .11 to .77. He reports a strong central tendency with a median of .433.

Gerberich[23] studied early editions of the ACE and found that they yielded correlation coefficients ranging from .17 to .81 for grade-point averages and a range of from .34 to .60 with freshman marks. Later studies on the ACE reported correlations of the ACE with college grades of students in various colleges. Super[24] reviews these later studies and reports modal correlations with first semester grades of about .45 for engineers and .50 for art students. He reports that the correlations found in these studies between ACE and grades over four years were about .45.

By contrast to Super's summary, Durflinger[25] summarized studies of prediction made from 1934 to 1943 and found a median correlation coefficient of .52. In summarizing this review, Durflinger states that

---

[22] Walter Gilbert Peiser, "The Prognosis Value of the American Council of Education Psychological Examination," (Unpublished Ph.D. Thesis, Louisiana State University, Baton Rouge, 1937).

[23] J. R. Gerberich, "Validation of a State-wide Educational Guidance Program for High School Seniors," School and Society, 1931, Vol. 34, pp. 606-610.

[24] Super, op. cit., p. 120.

[25] G. W. Durflinger, "The Prediction of College Success: A Summary of Recent Findings," Journal of the American Association of Collegiate Registrars, 1943, Vol. 19, pp. 68-78.

the higher figure might be due to one or both of two factors: (1) college instructors may be basing marks on achievement examinations and requirements more closely related to intelligence than was formerly true; and (2) the newer intelligence tests may measure more of the factors present in college grades than did former tests.

Johnson[26] in 1950 reviewed the literature on prediction, including in his review the summaries mentioned above and others. He found median correlation coefficients of approximately .44 - .45. In his study of veterans entering the University of Minnesota, Johnson found correlation coefficients between ACE test scores and the honor point ratios in various areas to be: natural science (.15 and .16); social studies (.36 and .35); and humanities (.31 and .43).

The studies reviewed in this section, plus those outlined in Table I, which predict college grades from intelligence test scores, are not intended to be exhaustive. It does however include an adequate sampling of the studies to give an idea of the tendencies. The studies reported do indicate that correlation coefficients vary from .21 to .67, with the median r falling between .40 and .50. These relationships are high enough to make them useful in studying groups of individuals but the extreme variations in correlation coefficients and the fact that the relationships are not especially high indicate that a counselor or

---

[26] Walter F. Johnson, "A Study of the Efficiency of Certain Factors for Predicting Achievement of Veterans at the Junior College Level in the College of Science, Literature and the Arts at the University of Minnesota," (Unpublished Ph.D. thesis, University of Minnesota, Minneapolis, 1950).

registrar should not rely upon intelligence test scores alone in predicting college success.

Wood concluded "that the intelligence examination predicts college success very nearly as well as college success, in terms of the best available index, predicts itself from one semester to another, or from one year to another. Since a test cannot predict a criterion better than the latter forecasts itself, all hope of improvement in the intelligence tests prediction depends upon improvement in the reliability and significance of the criterion."[27]

---

[27] B. D. Wood, "Measurement in Higher Education," World Book, Yonkers: World Book Company, 1923, p. 139.

TABLE I

ZERO ORDER CORRELATION COEFFICIENTS SHOWING RELATIONSHIP BETWEEN ACADEMIC APTITUDE TESTS AND COLLEGE SUCCESS

Test	Investigator (s)	Zero order coefficient		
ACE	Douglass & Lovegren [28]	.496		
ACE	May [29]	.60		
ACE	Williamson & Freeman [30]	.46		
ACE	Douglass [31]	.45		
ACE (men)	Hartson [32]	.53		
ACE (women)	Hartson [33]	.50		
ACE	Butsch [34]	.53		
ACE	DuBois [35]	.44		
ACE	Votaw [36]	.53		
ACE	Weber [37]	.45		
ACE	Smith [38]	.38		
ACE	Flemming [39]	.50		
ACE	Nelson [40]	.67		
ACE	Fritz [41]	.53		
ACE	Stalnaker [42]	.57		
ACE	Rhinehart [43]	.46		
ACE	Root [44]	.51		
ACE	Benton & Perry [45]	.31		
ACE	Crane [46]	.27	.29	.30
		.33	.35	.32
		.27	.30	.27
		.40	.43	.27
Alpha	De Camp [47]	.41		
Alpha	Stone [48]	.44		
Alpha	Stone [49]	.50		
Alpha, Otis	Toll [50]	.38	.33	.38
Minn. Coll. Apt. Test	Douglass & Lovegren [51]	.41		
Minn. Coll. Apt. Test	Williamson [52]	.48		
Minn. Coll. Apt. Test (men)	Williamson & Freeman [53]	.40		
Minn. Coll. Apt. Test (women)	Williamson & Freeman [54]	.50		
Ohio Univ. Psy. Ex. (men)	Williamson & Freeman [55]	.53		
Ohio Univ. Psy. Ex. (women)	Williamson & Freeman [56]	.54		
Ohio Univ. Psy. Ex.	Read [57]	.42		
Ohio Univ. Psy. Ex.	Garrett (52 colleges) [58]	.61		
Ohio Univ. Psy. Ex.	Flemming [59]	.46		
Otis Self-Admin.	Prescott & Garretson [60]	.21		
Otis Self-Admin.	Odell [61]	.58		
Otis Self-Admin.	Guiler [62]	.48	.40	.49
C. C. A.	Guiler [63]	.45	.44	.47
Terman	Guiler [64]	.49	.48	.52

Footnotes - Table 1

[28] H. R. Douglass and L. A. Lovegren, "Prediction of Success in General College," (Unpublished Study, University of Minnesota, Minneapolis, 1937).

[29] M. A. May, "Predicting Academic Success," Journal of Educational Psychology, 1923, Vol. 14, pp. 429-440.

[30] E. G. Williamson and E. M. Freeman, University of Minnesota Studies in Predicting Scholastic Achievement, Part I, University of Minnesota Press, Minneapolis, 1942.

[31] H. R. Douglass, The Relation of High School Preparation and Certain Other Factors to Academic Success at the University of Oregon, University of Oregon Publication, Education Series III, (September, 1931).

[32] L. D. Hartson, "The Validation of the Rating of 23 Tests for Predicting Freshman Scholarship at Oberlin College," School and Society, 1932, Vol. 36, pp. 413-416.

[33] Ibid.

[34] R. L. C. Butsch, "Improving the Prediction of Academic Success Through Differential Weighting," Journal of Educational Psychology, 1939, Vol. 30, pp. 401-420.

[35] P. H. DuBois, "Achievement Ratios of College Students," Journal of Educational Psychology, 1939, Vol. 30, pp. 699-702.

[36] D. F. Votaw, "A Comparison of Test Scores of Entering College Freshmen as an Instrument for Predicting Subsequent Scholarship," Journal of Educational Research, 1946, Vol. 40, pp. 215-218.

[37] C. O. Weber, "Old and New College Board Scores and Grades of College Freshmen," Journal of American Association of Collegiate Registrars, 1944, Vol. 20, pp. 70-75.

[38] F. F. Smith, "The Use of Previous Records in Estimating College Success," Journal of Educational Psychology, 1945, Vol. 36, pp. 167-176.

[39] E. G. Flemming, "College Achievement, Intelligence, Personality, and Emotion," Journal of Applied Psychology, 1932, Vol. 16, pp. 668-674.

[40] M. J. Nelson, "Some Data From Freshman Tests," School and Society, 1933, Vol. 37, pp. 262-264.

[41] R. A. Fritz, "Predicting College Marks and Teaching Success in a Teachers College," Journal of Applied Psychology, 1933, Vol. 17, pp. 439-446.

[42] J. M. Stalnaker, "American Council Psychological Examination for 1936 at Purdue University," School and Society, 1928, Vol. 27, pp. 86-88.

[43] J. B. Rinehart, "An Attempt to Predict the Success of Student Nurses by the Use of a Battery of Tests," Journal of Applied Psychology, 1933, Vol. 17, pp. 277-293.

[44] A. R. Root, "The Thorndike College Entrance Tests, First Semester Grades, Binet Tests," Journal of Applied Psychology, 1923, Vol. 7, pp. 77-92.

[45] A. L. Benton and J. D. Perry, "A Study of the Predictive Value of the Stanford Scientific Aptitude Test," Journal of Psychology, 1940, Vol. 10, pp. 309-312.

[46] Esther Crane, "Reports of Some Psychological Tests by Bryn Mawr College," School and Society, 1927, Vol. 25, pp. 640-644.

[47] J. E. DeCamp, "Studies in Mental Tests," School and Society, 1921, Vol. 14, pp. 254-258.

[48] C. L. Stone, "The Significance of Alpha in College," Journal of Educational Psychology, 1922, Vol. 13, pp. 298-302.

[49] _____, "Disparity between Intelligence and Scholarship," Journal of Educational Psychology, 1922, Vol. 13, pp. 241-244.

[50] C. H. Toll, "Scholastic Aptitude Tests at Amherst College," School and Society, 1928, Vol. 28, pp. 524-528.

[51] H. R. Douglass and L. A. Lovegren, "Prediction of Success in General College," (Unpublished Study, University of Minnesota, Minneapolis, 1937).

[52] E. G. Williamson, "The Significance for Educational Guidance of Personal Histories," School Review, 1936, Vol. 44, pp. 41-49.

[53] _____ and E. M. Freeman, University of Minnesota Studies in Predicting Scholastic Achievement, Part I, Minneapolis: University of Minnesota Press, 1942.

[54] Ibid.

[55] Ibid.

[56] Ibid.

[57] C. B. Read, "Prediction of Scholastic Success in a Municipal University," School and Society, 1938, Vol. 48, pp. 187-188.

[58] W. S. Garrett, "Ohio State Psychological An Instrument for Predicting Success in a Teachers College," Occupations, 1944, Vol. 22, pp. 489-495.

[59] E. G. Flemming, "College Achievement, Intelligence, Personality, and Emotion," Journal of Applied Psychology, 1932, Vol. 16, pp. 668-674.

[60] A. C. Prescott and O. K. Garretson, "Teachers' Estimates of Success in College," School Review, 1940, Vol. 48, pp. 278-284.

[61] C. W. Odell, "An Attempt at Predicting Success in the Freshman Year in College," School and Society, 1927, Vol. 25, pp. 702-706.

[62] W. S. Guiler, "The Predictive Value of Group Intelligence Tests," Journal of Educational Research, 1927, Vol. 16, pp. 365-374.

[63] Ibid.

[64] Ibid.

2. Studies relating scholastic aptitude to success in training. The inclusion of studies predicting success in training is justified by the frequency with which success in training is used as the criterion of vocational success.

Seagoe[65] administered the ACE to 31 education students and obtained ratings of success in two practice-teaching assignments for these students. The ratings were made by two training teachers. She reports a correlation coefficient of .12, with a probable error of .12 between these ACE scores and the average of these two success ratings. The reliability of these ratings were reported as .26. The measure of intelligence proved to be of little predictive value in this study.

Jones[66] studies 65 Wisconsin teachers, correlating the Henman-Nelson Intelligence Test and the ACE with grades in practice teaching. He found correlation coefficients of .24 and .02, respectively, between these two tests and success in training as measured by teacher grades in this student teaching situation.

Studies made during World War II by the Bureau of Naval Personnel, Test and Research Section, are reported in Personnel Research and Test Development.[67] Included in this report are studies correlating

---

[65] M. V. Seagoe, "Prediction of In-Service Success in Teaching," Journal of Educational Research, 1946, Vol. 39, pp. 658-663.

[66] R. D. Jones, "Prediction of Teaching Efficiency from Objective Measures," Journal of Experimental Education, 1946, Vol. 15, pp. 85-89.

[67] D. B. Stuit, Personnel Research and Test Development in the Bureau of Naval Personnel, Princeton, N. J.: Princeton University Press, 1947, p. 193.

selective measures and success in various aspects of the training program. Typical of these findings were the correlations between final academic average in Reserve Midshipmen's School and the following selection measures: NROTC Selective Examination, Form C, .46; Officer Qualification Test, Form 2, .45; and Test N-4 (V-12 Comprehensive Objective Test), .54. It is worthy of consideration in studying these results, to note that the candidates included in the primary officer training program were a highly selected group. Such selection would tend to lower the correlation coefficients.

The Officer Qualification Test was only moderately successful in predicting final average grades in the Women's Reserve Midshipmen's School. Correlations with final grades were slightly under .40.

In Indoctrination School, the Officer Qualification Tests correlated .50 with final average grades.

In the V-12 College Training Program, the Army-Navy College Qualifying Test (Test C-1) was correlated with first-semester grades. The correlation coefficient in this study of 204 cases was .58 (corrected for the restricted range of C-test scores in the sample).

Laycock and Hutcheon[68] found a correlation of .34 between ACE scores and freshman grade-point averages in engineering training. Brush[69] also studied various tests and their combinations to predict

---

[68] S. R. Laycock and N. B. Hutcheon, "A Preliminary Investigation Into the Problem of Measuring Engineering Aptitude," Journal of Educational Psychology, 1939, Vol. 33, pp. 28-29.

[69] Edward N. Brush, "Mechanical Ability as a Factor in Engineering Aptitude," Journal of Applied Psychology, 1941, Vol. 25, pp. 300-312.

engineering grades. He found a correlation of .43 between the Thorndike Intelligence Examination scores and four year engineering grades. Super[70] reports studies attempting to predict law school grades. A study of this sort at the University of Chicago showed a correlation of .56 between ACE scores and law school grades.

Success in training was the most frequently used criterion for the validation of the Army General Classification Test. Super[71] reports that correlation between the AGCT and grades in Army Specialized Training (college courses) and also in most West Point courses ranged from .12 to .40. He points out that this low correlation, according to the authors of the test, is no doubt partly due to the extreme preselection in these programs.

3. Studies relating scholastic aptitude to success on the job. Business and industry have devoted considerable attention to the problem of predicting success in various fields of work. Sales work has received, possibly, more attention than most fields.

Anderson[72] administered the Otis Self-Administering Test of Mental Ability to 500 sales clerks at Macy's. He found that 75 per cent of the intelligence test scores ranged in the 80 to 100 I. Q. group, 5 per cent were above 110 and 20 per cent were below 80. He concluded

---

[70] Super, op. cit., p. 344.

[71] Ibid., pp. 128-129.

[72] V. V. Anderson, Psychiatry in Industry, New York: Harper and Brothers, 1929, p. 46.

that intelligence tests were of little value in selecting sales clerks. Moore[73] found that studies of the relationship between intelligence and sales ability in salesmen of tangibles and intangibles have led to the use of other tests than intelligence tests because the predictive value of intelligence tests in sales work is negligible.

Prognosis in teaching has also received the attention of investigators. Rolfe[74] studied 52 Wisconsin school teachers who were teaching in one and two room schools. The ACE scores on these individuals were correlated with teaching success as determined by tested pupil progress. He found a correlation coefficient of -.10. Seagoe[75] studied the relationship between ACE scores and success in teaching as determined by rank on the staff of the school in which teachers were employed, as rated by the school administrators. This high school rank criterion correlated .49 with ratings made on these same teachers by training teachers and .66 with administrative scale ratings made at the same time as the administrators ranked the teachers on the high school staff. She found a correlation of .10. Rotsker,[76] however, studied the relationship between ACE scores and success ratings of 28 teachers in large

---

[73] H. Moore, Psychology for Business and Industry, New York: McGraw-Hill and Company, 1942, Ch. 16.

[74] J. F. Rolfe, "The Measurement of Teaching Ability: Study Number Two," Journal of Experimental Education, 1945, Vol. 14, pp. 52-74.

[75] M. V. Seagoe, "Prognostic Tests and Teaching Success," Journal of Educational Research, 1945, Vol. 38, pp. 685-690.

[76] L. E. Rotsker, "The Measurement of Teaching Ability: Study Number Two," Journal of Experimental Education, 1945, Vol. 14, pp. 6-51.

schools and found a correlation of .57. Success in this study was determined on the same basis as in Rolfe's study mentioned above: tested pupil progress.

Jones[77] studied 65 teachers located in 36 different schools. All of these teachers had graduated from the University of Wisconsin School of Education. He used two different criteria of teaching efficiency in his study: (1) supervisory (principals) ratings and (2) residual pupil gains. He administered two aptitude tests, the ACE and the Henman-Nelson I. Q. Test. He found that the ACE correlated .26 with pupil gain and .10 with supervisory ratings. The Henman-Nelson correlated .02 with pupil gain and .11 with supervisory ratings. Super[78] sums up his review of prognosis in teaching by saying that attempting to predict success in teaching has met with lack of success.

Pond and Bills[79] in a study of 780 clerical workers in an insurance company compared measured intelligence with level of job performed by subjects. Jobs were classified into eight levels from A to H with the A classification being the lowest level of job. Results showed that 82 per cent of those scoring zero to 40 on the intelligence test were in A or B jobs, while only 26 per cent of those scoring 140 or above were on

---

[77] R. D. Jones, "Prediction of Teaching Efficiency from Objective Measures," Journal of Experimental Education, 1946, Vol. 15, pp. 85-89.

[78] Super, op. cit., pp. 100-101.

[79] Millicent Pond and Marion A. Bills, "Intelligence and Clerical Jobs; Two Studies of Relation of Test Scores to Job Held," Personnel Journal, 1933, Vol. 12, pp. 41-56.

these low level jobs. In another study of 133 clerical workers, Bills[8] found a correlation coefficient of .22 with difficulty of job. Two and one-half years later the correlation was .41 for those who were still employed. The more intelligent had left the low grade jobs, either to be advanced to higher level jobs in the company or to leave for other jobs and the less intelligent had left the higher grade jobs.

Wadsworth[81] also found job differences in intelligence test scores He established acceptable score ranges in light of the character of job in his industry. In order to justify selecting employees by intelligence tests he studied employee records. Of those men hired without test results, 29 per cent were rated by supervisors as being problem employees, whereas only 5.5 per cent of the test-selected employees were so rated. Additional data revealed that 33 per cent of the test selected subjects were rated as outstanding, while only 22 per cent of the other group were so rated. Satisfactory ratings were given to 61.5 per cent of the test-selected group, while only 49 per cent of the non-test-selected group were given this rating.

Stevens and Wonderlic[82] administered the Otis Self-Administering Test of Mental Ability to 160 branch office managers for a personal

---

[80] Ibid.

[81] Guy W. Wadsworth, Jr., "Tests Prove Worth to a Utility," Personnel Journal, 1935, Vol. 14, pp. 183-187.

[82] S. N. Stevens and E. F. Wonderlic, "The Relationship of the Number of Questions Missed on the Otis Mental Tests and Ability to Handle Office Detail," Journal of Applied Psychology, 1934, Vol. 18, pp. 364-368.

finance company. These subjects were classified into two groups, those who had been severely criticized for their method of handling details, organizing their office procedures, and generally following office procedures, and those who had not been criticized on these bases. These groups were then compared in terms of the number of questions missed on the Otis. This study revealed that 80.6 per cent of the group that had been criticized missed 16 or more questions, whereas of the group not criticized only 25.5 per cent missed 16 questions or more.

Bransford and others[83] and Mandell and Adkins[84] studied Civil Service employees, using ACE scores and combined ratings of administrative effectiveness, the average number of raters being four. They found a correlation of .64 between ACE scores and ratings of 20 civil servants at top management levels. For the staff groups, 63 specialists at a lower level, the correlation was .30.

Tiffin and Lawshe[85] studied the relationship between the Adaptability Test (a short mental alertness test designed specifically for personnel placement) and job success. In one validation study, 70 men in one rubber plant were selected by usual means and upgraded to supervisory positions. After selection they were given the Adaptability Test, and ranked in four groups according to scores on the test: group 1,

---

[83] T. L. Bransford, et al, "A Study of the Validity of Written Tests for Administrative Personnel," American Psychologist, 1946, Vol. 7, p. 279.

[84] M. Mandell and D. C. Adkins, "Validity of Written Tests for the Selection of Administrative Personnel," Education and Psychological Measurement, 1946, Vol. 6, pp. 293-312.

[85] Joseph Tiffin and C. H. Lawshe Jr., "The Adaptability Test," Journal of Applied Psychology, 1943, Vol. 27, pp. 152-163.

scores 0 to 4; group 2, 5 to 9, group 3, 10 to 14; and group 4, 15 or over. Six months after the upgrading took place, study revealed that all of these in group 1 were no longer on the job, while only 5 per cent of those scoring 15 or more were no longer on the job. A systematic trend followed throughout the four groups.

Bingham and Davis[86] used an army-type intelligence test with 102 business executives and correlations were studied with business success as indicated by a rating based on information contained in personal history records (salary, investments, debts, clubs, theatre attendance, etc.). The correlation coefficient found was -.10. They concluded that intelligence, above a certain minimum, contributes relatively less to business success than do other non-intellectual traits of personality.

Harrell[87] studied 42 overseers in three different cotton mills. These supervisors were rated as satisfactory or unsatisfactory by their supervisors and this rating was compared with scores on the Otis Self-Administering Test of Mental Ability. When an I. Q. of 100 was considered the critical score on the Otis, it was found that 100 per cent of those above the critical score were rated successful, while only 70 per cent of those below the critical score were considered successful.

---

[86] W. V. Bingham and W. G. Davis, "Intelligence Test Scores and Business Success," Journal of Applied Psychology, 1924, Vol. 8, pp. 1-22.

[87] Willard Harrell, "Testing Cotton Mill Supervisors," Journal of Applied Psychology, 1940, Vol. 24, pp. 31-35.

In 1917 and 1918 Proctor[88] administered the Army Alpha Group Test of Intelligence to 1,514 school children in high schools and then 13 years later, in 1930 and 1931 he followed up 945 of them who could be contacted. At this later date he used the Barr Scale for a measure of vocational status. The people were divided into five occupational groups as specified by the Barr Scale. He then studied the average intelligence of the people who were in these various groups. Table 2 (page 56) presents the data obtained through this study.

Proctor concluded that persons ranking high in intelligence tend to gravitate toward higher ranking vocations. Numerous other studies are available in the professional literature considering this same problem, but they have been carefully reviewed by other investigators. Super[89] has a careful survey of such studies and their findings.

4. Scholastic aptitude related to job satisfaction. There are relatively few studies reported in the professional literature which investigate the relationship between measured scholastic aptitude and job satisfaction. However, some of the studies reported in the professional literature were found to be relevant to this investigation.

Scott and Hayes[90] conducted one of the early studies in this area.

---

[88] W. M. Proctor, "Intelligence and Length of Schooling in Relation to Occupational Levels," School and Society, 1935, Vol. 42, pp. 783-786.

[89] Super, op. cit., pp. 92-99.

[90] W. D. Scott and M. H. S. Hayes, Science and Common Sense in Working with Men, New York: Ronald Press, 1921, p. 78.

TABLE 2

AVERAGE INTELLIGENCE OF STUDENTS WHO CHOSE VARIOUS OCCUPATIONAL GROUPS

Average I. Q.	Occupational Group	Number of cases	Typical Jobs in Occupational Group
115	I	130	Business executive College professor Dentist Engineer Lawyer Physician Surgeon
108	II	565	Business managers Real estate and Insurance brokers Nurses House wives Farm managers Private secretaries Salesmen Teachers
104	III	228	Bookkeepers Electricians Clerical workers Salespersons Stenographers Mechanics
99	IV	12	Foundrymen Janitors Letter carriers Mill hands
97	V	10	Unskilled laborers
Total 107.6		945	

The study was made before present-day measures of mental ability were as widely used, but they did arrive at an estimate of intelligence. They considered grade of school attained, and years retarded or advanced in school to be indicative of intelligence. Job satisfaction was gauged by interviewing the workers. These investigators found that the relationship obtained varied from one occupation to another. With inspectors on a low-level job, the greater the mental ability the greater the dissatisfaction. The results for assemblers, a job that required more skill, produced opposite results: those who were most frequently dissatisfied were those with the lowest ability, and those who were the least frequently dissatisfied were the most able mentally.

Scott, Clothier, Mathewson and Spriegel[91] did a later study of men working in several different jobs in one company. They used the same measure of intelligence as did Scott and Hayes, but used desire to change jobs as the measure of job satisfaction. They found that men who were working in simple, physically demanding jobs, who were two or three years retarded in school, tended to be dissatisfied, while those who were either more or less retarded were more likely to be satisfied. For men who worked at a monotonous, repetitive inspection job the per cent desiring a change increased with intelligence. In more complex assembly work, desire to change jobs decreased as intelligence increased, for in this job, men with ability

---

[91] W. D. Scott, R. C. Clothier, S. B. Mathewson, and W. R. Spriegel, Personnel Management, New York: McGraw-Hill, Inc., 1941, p. 464.

had more opportunity to use it and the less able men felt the strain of the more difficult work.

Anderson[92] studied labor turn-over in the packing department at R. H. Macy's and found that the brighter employees tended to leave the job sooner, seeking jobs more commensurate with their abilities.

A study of 971 home economics teachers, reported in the American Vocational Association Research Bulletin,[93] investigated job satisfaction in two ways: (1) an adaptation of a job satisfaction blank developed by Hoppock, and (2) reaction to a series of items on living conditions, family and marriage, salary, profession, school conditions, teaching load, living conditions, and community conditions. Of interest to the present research were the positive correlations found between years of graduate study and job satisfaction and also between years of experience in teaching and job satisfaction. A greater amount of supervision brought greater satisfaction, as did larger teaching loads. The only exact correlations reported were between job satisfaction and years of experience (r = .1691).

Brayfield[94] studied the relationship between general ability

---

[92] V. V. Anderson, Psychiatry in Industry, New York: Harper and Brothers, 1929, pp. 88-89.

[93] Factors Affecting the Satisfaction of Home Economics Teachers, American Vocational Association Research Bulletin, No. 3, Washington, D. C.: Committee on Research Publications, American Vocational Association, Inc., May, 1948.

[94] Arthur H. Brayfield, "The Interrelationship of Measures of Ability, Aptitude, Interests and Job Satisfaction among Clerical Employees," (Unpublished Ph.D. thesis, University of Minnesota, Minneapolis, 1946).

and job satisfaction among clerical workers with McKesson and Robbins, Inc., wholesale druggists. General ability was measured by the Tiffin-Lawshe Adaptability Test, Form B; job satisfaction was measured by a job satisfaction blank filled out by the employees. He found that the relationship varied among various levels of clerical workers. The results are reported as follows: (1) stenographers, no significant difference between more satisfied and less satisfied workers; (2) general clerical workers, no significant difference; (3) typists, no significant difference; (4) high level machine clerical, the mean difference was significant at the 1 per cent level; (5) low level machine clerical, no significant difference; (6) entry clerical workers, no significant difference. The statement, no significant difference, means that there were no significant differences at either the 5 per cent or the 1 per cent levels. In the group of high level machine clerical workers, it was noted that twice as many of the more satisfied have completed twelve or more years of high school than have the less satisfied.

Many researchers have studied turn-over rates as measures of job satisfaction. Clark[95] studied 105 teachers of vocational agriculture who began teaching vocational agriculture in Michigan between July 1, 1936, and June 30, 1941, and who were graduates of Michigan State College. Of these 105, 78, or 74.3 per cent, had left their jobs, and 27, or 25.7 per cent, were still teaching vocational agriculture in the school year 1948-49. The group who left were compared with the group

---

[95] Raymond M. Clark, "Factors Associated with Decisions of Michigan Teachers to Remain in or to Leave the Field of Teaching Vocational Agriculture," (Unpublished Ed.D. thesis, Michigan State College, East Lansing, Michigan, 1950).

who remained with respect to selected aspects of academic background.

Clark's study is significantly related to this study for several reasons: (1) The study is concerned with a vocation closely related to extension work; (2) there is a certain overlapping of the sample with individuals included in the present investigation, inasmuch as ten of the individuals included in his study are now employed as County Agents or 4-H Club Agents; (3) the fact that the teachers left the profession of teaching vocational agriculture can be considered as an indication of a certain degree of dissatisfaction on the part of the majority of the group who left, because if they were highly satisfied, many of this group would still be in the same work; (4) the study is concerned with several of the same academic factors as were considered in the present investigation.

In this study, Clark found no significant differences on ACE scores for those who remained on the job and those who left. If leaving the job can be considered an indication of a lesser degree of satisfaction, then there was no significant relationship between these ACE scores and job satisfaction.

Taft and Mullins[96] studied salaried administrative employees in an organization manufacturing munitions. They found that employees of low intelligence, capable of handling only routine office tasks, had

---

[96] R. Taft and A. Mullins, "Who Quits and Why," Personnel Journal, 1946, Vol. 24, No. 8, pp. 300-307.

the only outstandingly low rate of turn-over for the various intelligence levels. Young men of superior intelligence had quite a low rate but this trend reversed over the age of 25. Women with superior intelligence had a turn-over rate of 50 per cent greater than the general rate. Age made little difference in women except in the extremes (superior intelligence - older women, had high turn-over rate; low intelligence - older women, had a low rate). They concluded that dissatisfaction, when so stated as reason for termination of employment, particularly affected men of superior intelligence in responsible positions and women in the younger age group who had superior intelligence and jobs of little responsibility.

Other studies reported in the professional literature found no significant relationship between general ability and estimates or measures of job satisfaction. Quayle[97] related Otis Mental Ability Test scores to job satisfaction on a group of stenographers and found no correlation. Kornhauser and Sharp[98] found that measured intelligence was unrelated to work attitude scores for girl employees of a paper mill. Wesley[99] studied the relationship between scores on the

---

[97] M. S. Quayle, "A Study of Some Aspects of Satisfaction in the Vocation of Stenography," Teachers College, Columbia University Contributions to Education, No. 659, New York, Bureau of Publications, Teachers College, Columbia University, 1935.

[98] A. W. Kornhause and A. A. Sharp, "Employee Attitudes: Suggestions from a Study in a Factory," Personnel Journal, 1932, Vol. 10, pp. 393-404.

[99] S. M. Wesley, "A Quantitative Study of Job Satisfaction in a Sample of Former University of Minnesota Students," (Unpublished M.S. thesis, University of Minnesota, Minneapolis, 1939).

College Aptitude Test and job satisfaction as measured by the Hoppock Blank on a group of former college students. Studying those who had graduated, he found that students with high scores on the College Aptitude Test were less satisfied than graduates with low scores. Among the non-graduates there was no such difference. In comparing the graduates with the non-graduates in the low C. A. T. group, he found that the graduates tended to be more satisfied. The over-all correlation between the Hoppock Blank scores and the C. A. T. scores was -.13. Berdie[100] studying the relationship between the American Council on Education Psychological Examination scores and job satisfaction scores on students in engineering training found no significant relationship between the two measures.

B. Academic Grades Related to Vocational Adjustment

A review of the professional literature on the relationship between grades in academic training and vocational adjustment reveals that few investigators have concerned themselves with this problem. Further analysis reveals that those studies that are reported seldom have used strictly vocational criteria for validating the predictive value of grades. Rather, these studies have used grades in college or grades in training as the measure of vocational adjustment. This investigator is dubious of the validity of such a practice, inasmuch as it assumes a high degree of relationship between those grades in

---

[100] R. F. Berdie, "Prediction of College Achievement and Satisfaction," Journal of Educational Psychology, 1943, Vol. 28, pp. 239-245.

training or college and success on the job. At present, there is insufficient evidence to justify this assumption.

Granted that such investigations, using college grades as the criterion of work adjustment, are validating the predictive ability of grades by using criterion measures that have in themselves been inadequately validated, such studies have been made and should be reviewed for their potential value. Should future investigations show that college grades are closely related to vocational adjustment, the aforementioned studies will be of greater value to people concerned with predicting the future vocational adjustment of students.

1. Studies relating high school grades to college grades. Although college grades cannot be classed as strictly vocational criteria, this investigator includes a brief review of some of the studies. These are reviewed in the present study because of the prevalent practice of using college grades as a vocational criterion. Table 3 (page 64) shows the results of some of these studies reviewed.

Examination of the studies presented in Table 3 reveals that the correlation between high school grades and college grades is higher in general than was the relationship found between meansures of academic aptitude and college grades. The correlation coefficients on the former run above .50 in general, while the coefficients on the latter tended to fall below .50. From this limited group of studies it would appear that high school grade average is a better predictor of college achievement than is test measured academic aptitude.

TABLE 3

STUDIES CORRELATING HIGH SCHOOL SCHOLARSHIP AVERAGE WITH COLLEGE SCHOLARSHIP AVERAGE

Investigator (s)	Zero order coefficient
Edds & McCall [101]	.65
Finch & Nemzek [102]	.79
Garrett [103]	.67
Read [104]	.63
Williamson [105]	.54
Douglass [106]	.56
Williamson & Freeman [107]	.53
Proctor [108]	.52
Odell [109]	.55
Bolenbaugh & Proctor [110]	.49
Crawford & Burnham [111]	.57
Prosser [112]	.51
Whitney & Leuenberger [113]	.50
Pierson & Nettels [114]	.52
Jones [115]	.60
Anderson & Spenser [116]	.54
Byrns & Henmon [117]	.74

Footnotes - Table 3

---

[101] H. J. Edds and W. M. McCall, "Predicting the Scholastic Success of College Freshmen," Journal of Educational Research, 1933, Vol. 27, pp. 127-131.

[102] F. H. Finch and C. L. Nemzek, "Prediction of College Achievement from Data Collected During the Secondary School Period," (Unpublished paper, University of Minnesota, Minneapolis, 1934).

[103] W. S. Garret, "Ohio State Psychological an Instrument for Predicting Success in a Teachers College," Occupations, 1944, Vol. 22, pp. 489-495.

[104] C. B. Read, "Prediction of Scholastic Success in a Municipal University," School and Society, 1938, Vol. 48, pp. 187-188.

[105] E. G. Williamson, "The Significance for Educational Guidance of Personal Histories," School Review, 1936, Vol. 44, pp. 41-49.

[106] H. R. Douglass, et al., "Prediction of Success in the Law School," University of Minnesota Studies in Predicting Scholastic Achievement, Part II, Minneapolis: University of Minnesota Press, 1942, pp. 46-60.

[107] E. G. Williamson and E. M. Freeman, University of Minnesota Studies in Predicting Scholastic Achievement, Part I, Minneapolis: University of Minnesota Press, 1942.

[108] W. M. Proctor, "The High School's Interest in Methods of Selecting Students for College Admission," School and Society, 1925, Vol. 23, pp. 441-448.

[109] C. W. Odell, "An Attempt at Predicting Success in the Freshman Year in College," School and Society, 1927, Vol. 25, pp. 702-706.

[110] Lawrence Bolenbaugh and W. M. Proctor, "Relation of the Subjects Taken in High School to Success in College," Journal of Educational Research, 1927, Vol. 15, pp. 87-92.

[111] A. B. Crawford and P. S. Burnham, "Entrance Examinations and College Achievement," School and Society, 1932, Vol. 36, pp. 344-352.

[112] M. R. Prosser, "Study of Scholastic Performance of Freshmen Women at the University of Iowa," University of Iowa Studies in Education, Iowa City: University of Iowa, 1930.

[113] F. L. Whitney and H. W. Leuenberger, "The College Success and Mortality of State Teachers College Freshmen as Related to Intelligence and High School Achievement," Educational Administration and Supervision, 1930, Vol. 16, pp. 668-672.

[114] C. D. Pierson and C. H. Nettels, "A Study of High School Seniors to Determine Who Shall be Admitted to College," School and Society, 1928, Vol. 28, pp. 215-216.

[115] J. W. Jones, Study of Certain Problems Dealing With Scholastic Achievement in a Teachers College, Indiana University School of Education Bulletin, No. 5, (April, 1929) pp. 33-40.

[116] J. E. Anderson and L. T. Spenser, "The Predictive Value of the Yale Classification Tests," School and Society, 1926, Vol. 24, pp. 305-312.

[117] R. K. Byrns and V. A. C. Henmon, "Long Range Prediction of College Achievement," School and Society, 1935, Vol. 41, pp. 877-880.

2. Studies relating high school grades to success in training. In addition to the studies correlating high school grades with college grades, specific studies have been made attempting to determine the relationship between high school grades and grades in professional and pre-professional training programs.

Stuit[118] studied the relationship between high school science grades and success in medical school and found a correlation coefficient of .465. Further study of the data revealed a correlation of .45 between college grades in liberal arts and medical grades. Carrying the study further, he found a correlation of .46 between grades in pre-medical science courses and grades in medical school.

Laycock and Hutcheon[119] found a correlation of .61 between last year high school marks and freshmen grade-point average in engineering school.

Other studies reviewed related pre-professional grades to grades in professional programs. Adams[120] reported that total pre-law grade-point average, correlated with success in first year law school,

---

[118] D. B. Stuit, "The Prediction of Scholarship Success in a College of Medicine," Education and Psychological Measurement, 1941, Vol. 1, pp. 77-84.

[119] S. R. Laycock and N. B. Hutcheon, "A Preliminary Investigation into the Problem of Measuring Engineering Aptitude," Journal of Educational Psychology, 1939, Vol. 33, pp. 280-289.

[120] W. M. Adams, "Prediction of Scholastic Success in Colleges of Law," Educational and Psychological Measurement, 1944, Vol. 4, pp. 13-19.

produced a correlation coefficient of .67. Smith[121] reports on studies done at the University of Iowa in predicting grades in dental school. A correlation of .45 was discovered between pre-dental grades and total grades in dental school. Welker and Harrell[122] present the results of attempts to predict grades in law school at the University of Illinois. They found pre-law grades to be a better predictor of grades in law school than other prognostic measures. The correlation coefficient derived was .75.

Studying prospective teachers, Jones[123] found that four year grade-point average in college correlated with grades in practice teaching produced a coefficient of .30, while grade-point average in education produced a coefficient of .40 when correlated with the same criterion measure.

Seagoe[124] also correlated grades with success in student teaching assignments. She found success in student teaching correlated with various types of grades as follows: grades in all courses up to the teaching assignment, .52, P. E. - .10; grades in professional courses, .51, P. E. - .10; grades in education courses taken prior to teaching, .47, P. E. - .11.

---

[121] R. V. Smith, "Aptitudes and Aptitude Testing in Dentistry," Journal of Dental Education, 1943, Vol. 8, pp. 55-70; Quoted in Super, op. cit., p. 340.

[122] E. L. Welker and T. W. Harrell, "Predictive Value of Certain Law Aptitude Tests," Educational and Psychological Measurement, 1942, Vol. 2, pp. 201-207.

[123] R. D. Jones, "Prediction of Teaching Efficiency from Objective Measures," Journal of Experimental Education, 1946, Vol. 15, pp. 85-89.

[124] M. V. Seagoe, "Prognostic Tests and Teaching Success, Journal of Educational Research, 1945, Vol. 38, pp. 685-690.

3. Studies relating grades to success on the job. As was mentioned earlier in this chapter, relatively few studies appear in the professional literature which attempt to study the relationship between grades and strictly vocational criteria. This is probably due, in part, to the difficulty involved in obtaining valid measures of work effectiveness. Some of the studies located in the professional literature are related to the present study. These are reviewed in the following paragraphs.

Seagoe[125] correlated grades with success ratings which were obtained on individuals who had been teaching two years. The rating procedures used in this study are described earlier in this chapter. Relating teacher rank on the high school staff after two years of teaching experience to the college grades, she found these correlation coefficients: grade-point ratio for all courses up to the practice teaching assignment, .03, P. E. - .14; with grade-point ratio in professional courses, - .15, P. E. - .14; with grade-point ratio in education courses taken before teaching assignment, .01, P. E. - .14. In this study, it was revealed that the correlation of grades with success in practice teaching tended to disappear in the analysis of the relationship of grades to actual success ratings. The administrative ranking of the teachers correlated .66 with scores on the University of California Rating Scale used on this group of teachers at the same time. The scale ratings correlated

---

[125] Ibid., pp. 685-690.

.49 with the ratings made by the training teachers on this same group of teachers. It must be remembered, however, that Seagoe followed up just 25 students and that the criterion of success was not studied for validity.

Jones,[126] in his previously mentioned study, correlated grades with success on the job as determined by two measures, residual pupil gain and principals' ratings (using the Wisconsin "M" Blank, scored by the principal). In correlating pupil gain with grades, he found the following coefficients: with high school rank, .225; with four-year grade-point average in college, .078; with grade-point average in education courses, .26. When using the other criterion measure, supervisory ratings, he found the following coefficients: with four-year grade-point average in college, .24; with grade-point average in education courses, .20. None of these coefficients can be considered as indicative of significant relationships.

Lins[127] also studied the possibility of using grades as predictive measures in teaching. Correlating rank of teacher in her high school graduating class with measured pupil gain, the resultant coefficient was .688.

Kriner[128] did a five year study of teachers who graduated from

---

[126] R. D. Jones, "Prediction of Teaching Efficiency from Objective Measures," Journal of Experimental Education, 1946, Vol. 15, pp. 85-99.

[127] L. J. Lins, "The Prediction of Teaching Efficiency," Journal of Experimental Education, 1946, Vol. 15, pp. 2-60.

[128] H. L. Kriner, "Five-Year Study of Teachers College Admissions," Educational Administration and Supervision, 1937, Vol. 23, pp. 192-199.

two and four year curricula in a teachers college. After these two groups of teachers had taught one year, they were rated by their superintendents and these ratings were correlated with various grades received in college. Studying the group who had completed the four year curriculum, he found that the ratings correlated with various marks in this way: college social studies marks, .129; college English marks, .225; college science marks, .480; all college marks, .451; college professional marks, .402; student teaching marks, .401. Studying the group who had completed the two year curriculum, he found the following correlation coefficients between ranking and various grades: college science marks, .465; student teaching marks, .339; two year all-college average, .401.

Sandiford and others[129] summarized 16 studies predicting success in teaching and report a range of correlations from .06 to .70 between marks in practice teaching and measures of success. The median coefficient reported in the 16 studies was .23.

Oppenheimer and Kimball[130] did a ten year study which included a follow-up on 318 boys and girls who graduated from high school in 1937. They received answers to a questionnaire they sent out from 218 of the original 318 individuals. Of these subjects, 150 answered the vocational part of the questionnaire. In this study the investigators

---

[129] Peter Sandiford and Others, Forecasting Teaching Ability, University of Toronto Department of Education Research Bulletin, No. 8, 1937.

[130] C. Oppenheimer and R. F. Kimball, "Ten-Year Follow-up of 1937 High School Graduates," Occupations, 1947, Vol. 26, No. 4, pp. 228-234.

compared the 35 members of the class who made up the top 20 per cent of the class academically with the rest of the class. They discovered that one-half of the top group were in professional or semi-professional occupations, while one-fifth of the rest of the class were in this group; none of the top group were in administrative or managerial positions or owned stores, while 19 of the rest of the class were in this group of occupations; 13 of the top group were in clerical, sales, and kindred work, while 24 of the rest of the class were in this type of work.

4. Studies relating grades to job satisfaction. One study was located in the professional literature that investigated the relationship between grades and job satisfaction. Clark,[131] as reported earlier in the chapter, studied teachers of vocational agriculture who had left the job and compared them with those who had remained upon the job. Because turn-over can logically be considered as evidence of a lesser degree of satisfaction, the lack of significant differences between the two groups reported in this study would indicate that grades for these groups of teachers of vocational agriculture were not significantly related to job satisfaction. His study included both grades in technical agriculture courses and grades in the total undergraduate program.

The study by Scott and Hayes[132] reported earlier in this chapter

---

[131] Clark, op. cit.

[132] W. D. Scott and M. H. S. Hayes, Science and Common Sense in Working with Men, New York: Ronald Press, 1921, p. 78.

in the section on the relationship of academic aptitude to job satisfaction studied this relationship indirectly. The measures of mental ability used in this study were year of school attained, and years retarded or advanced in school. Job satisfaction was determined by interviewing the workers. The justification for mentioning this study here is that there would be a direct correlation between grades and the criterion of years retarded or advanced in school. Obviously, only those students with extremely high grades would be advanced in school, while those with extremely low grades would be the students who were retarded in school. The relationship between school work and job satisfaction was found to vary from one occupation to another. On studying inspectors with low-level jobs, the greater the mental ability found, the greater the dissatisfaction that was indicated. For assemblers, a job requiring more skill, opposite results were found; those who were most frequently dissatisfied were those with lower ability, and those who were the least frequently dissatisfied were the most able mentally, or in this case had the highest grades.

Summary of Chapter III

The review of literature in Chapter II was divided into two major areas: Part I considered literature related to prognostic measures, and Part II reviewed prediction studies.

Summary of Part I. The literature on the American Council on Education Psychological Examination revealed that the annual editions of this test have been carefully constructed and that considerable

research has been done to determine or establish the reliability and validity of the various editions of the examinations. It may be concluded that the ACE is a reliable and valid test of scholastic aptitude.

Grades are used as prognostic measures and frequently are used as measures of success on the job. The low reliability of classroom teachers' grades is recognized. The majority of studies point out this unreliability.

Summary of Part II. The review of literature in this section of Chapter II concerns itself with various related prediction studies. The review is not intended to be exhaustive, but is, rather, an attempt to present an adequate sampling of previous prediction studies in order to investigate the range and tendencies of the correlations between grades and intelligence tests on the one hand and various measures of vocational adjustment on the other. These studies reviewed here have been selected because of their relation to the present study.

In selecting studies of the relationship between academic aptitude or intelligence to work adjustment, an attempt was made to select as many studies as possible relating the ACE to various measures of work adjustment.

Relating aptitude test results to college grades, 56 coefficients were reported. These correlation coefficients ranged from .21 to .67, with a median r of .45, and a mean r of .433. In the studies using the ACE as the prognostic measure, coefficients ranged from .27 to

.67, with a median r in the neighborhood of .44 to .45. Ten of these coefficients were within the range of .40 to .50. Six of the seven summaries of such studies in this area reported median r's of .44 to .45, the seventh reporting a median r of .52.

The reviewed studies investigating the relationship between aptitude test results and success in training reported correlations ranging from .02 to .58. The lowest coefficients were reported in the study of the relationship of aptitude to success in practice teaching, while the highest coefficients were found in service schools. Grades in law school, medical school, and engineering school also showed higher correlations with academic aptitude than did success in practice teaching. The higher correlations found in service schools are particularly interesting when it is considered that a highly select group was being studied. These results in service schools should not be interpreted as being indicative of a high relationship between academic aptitude and success on the job in military service. At best, grades in service schools are poor substitutes for on-the-job measures of success. The same criticism might be made of the correlations found in professional schools.

Correlations ranging from -.10 to .64 were reported in studies relating academic aptitude to success on the job. The coefficients varied, depending upon the type of work and the measures of success used in the investigation. In general, little success was had in predicting success in teaching from aptitude test scores. Also attempts to predict success in sales work from academic aptitude test scores met with little success. Most of the studies reported in

business and industry revealed a positive relationship between intelligence and success on the job, although Bingham and Davis concluded that "superiority in intelligence, above a certain minimum, contributes relatively less to business success than does superiority in several non-intellectual traits of personality."[133]

The studies reviewed which related academic aptitude to job satisfaction revealed data that would lead an investigator to assume that the relationship varies not only with the occupation but with the difficulty of the job being performed. A number of the studies reviewed found no relationship between the two measures.

In the review of literature pertaining to the prediction of college grades from high school grades, 17 studies were reported. Correlation coefficients ranged from .49 to .79, with a median r of .55 and a mean r of .583.

In the 12 studies reviewed which attempted to determine the relationship between high school marks or pre-professional marks and grades in professional training programs, the range of correlation coefficients was from .30 to .75, with a median r of between .465 and .47 and a mean r of .505.

In studies predicting success on the job from grades, the only studies reporting correlation coefficients were those attempting to predict success in teaching. The range of coefficients in the four

---

[133] W. V. Bingham and W. T. Davis, "Intelligence Test Scores and Business Success," Journal of Applied Psychology, 1924, Vol. 8, pp. 1-22.

studies was from -.15 to .688 (each study reported several coefficients, relating various grade-point averages to various measures of success). The median r was between .24 and .26 and the mean r was .287. Summarizing 16 studies predicting success in teaching from grades, Sandiford and Others[134] report a range of correlation coefficients from .06 to .70 between marks in practice teaching and measures of teaching success, with a median coefficient of .23. In general, grades have not been shown to be good predictors of success in teaching. Perhaps teaching is too broad a category to be included in a single occupational group for the purposes of prediction. It might also be remembered that the measures of success used in these reported investigations are in need of further study, before investigators can be satisfied that they are actually measuring success on the job.

The only study reviewed relating grades to job satisfaction in general reported that the relationship varied from one occupation to another. Clark[135] found no significant relationships between grades and leaving the job of teaching vocational agriculture (an indication of job satisfaction).

---

[134] Peter Sandiford and Others, Forecasting Teaching Ability, University of Toronto Department of Education Research Bulletin, No. 8, 1937.

[135] Raymond M. Clark, "Factors Associated With Decisions of Michigan Teachers to Remain in or to Leave the Field of Teaching Vocational Agriculture," (Unpublished Ed.D. thesis, Michigan State College, East Lansing, Michigan, 1950).

CHAPTER IV

SAMPLE AND PROCEDURES USED IN THE STUDY

This chapter is concerned with the specific procedures involved in sampling, a description of the sample, and the procedures involved in gathering data, handling the data and analyzing the data.

The Sampling Procedure

Although the over-all Research Committee has made plans to study extension workers in other states, the present investigation was limited to the study of agents presently employed by the Michigan Extension Service. An inter-state project is in the formative stages, but the Research Committee decided that the initial phase of the investigation should center upon County Agents and 4-H Club Agents now working in Michigan.

The entire group of agents, insofar as possible, was included in the present study because to use any number less than the total group would have reduced the size of the sample to below desirable limits. This group of County Agents and 4-H Club Agents were well suited to the purposes of this study for several reasons. First, by choosing the total group of agents and restricting the interpretations to the Michigan agents, there was no problem as to the representativeness of the sample. Second, restricting the sample to Michigan agents facilitated the gathering of data, an important consideration in light of the limited financial resources of the Research Committee. Third, the

fact that the Michigan Extension Service had initiated the project and had appointed the Extension Training Specialist as the chairman of the Research Committee insured the cooperation of the Extension Service in the gathering of research data through their regular meetings and from their personnel files. This cooperation also facilitated the obtaining of success ratings on the agents included in the sample. Fourth, the fact that the chairman of the Research Committee, who is also the Extension Training Specialist, had excellent rapport with the agents increased the possibilities of understanding and cooperation on the part of the agents.

In rating these agents on work effectiveness, it was deemed inadvisable to include any men who had not been on the job at least one year. Discussion of the matter with the Extension Administrators and the Research Committee brought about the decision that insufficient data were available on these men to do an adequate job of rating them on their performance on this job. However, only two men were affected by this decision. The total sample of 4-H Club Agents, after the two above agents were eliminated, was composed of 48 men who had been on the job for at least one year.

The Research Committee decided that a better over-all research project would result if all phases of the investigation used the same samples. Thus, because it was not possible to obtain a score on the Strong Vocational Interest Blank for one of the County Agents, it was decided to exclude this agent from the sample. The total sample of County Agents, after this one man was eliminated, was composed of 81 men who had been on the job at least one year.

Description of the Sample

In order to have a more complete picture of the sample, it was deemed advisable to obtain data relative to the age and years of experience in the Michigan Extension Service. In addition to helping complete the description of the sample, the data relative to age and tenure was used to study the relationship between these two criteria and the measures of work adjustment.

The birthdates of the agents were obtained from the personnel files of the Michigan Extension Service. From these data, the ages were computed as of May 1, 1951. In order to compute the number of years of service for each agent, the date that each agent was appointed was obtained from the office of the Secretary of the Board of Agriculture. Because some of the agents have changed jobs from one county to another or from the position of 4-H Club Agent to the position of County Agent, the figures arrived at do not represent the number of years on the present job, but rather the total number of years between the date of appointment to the extension staff and May 1, 1951.

The distribution of the County Agents and 4-H Club Agents according to age is presented in Table 4 (page 81).

Table 5 (page 82) presents the distribution of the County Agents and 4-H Club Agents according to years of experience with the Michigan Extension Service.

For a more complete picture of the age and tenure of the County Agents and 4-H Club Agents, the means and standard deviations of the two groups on these criteria were computed. This data is presented in Table 6 (page 83).

TABLE 4

DISTRIBUTION OF THE COUNTY AGENTS AND 4-H CLUB AGENTS ACCORDING TO AGE

Intervals	Frequency	
	County Agents	4-H Club Agents
60 - 65	5	1
55 - 59	3	0
50 - 54	14	1
45 - 49	11	4
40 - 44	14	3
35 - 39	15	8
30 - 34	15	15
25 - 29	3	11
20 - 24	1	5
Total	81	48

TABLE 5

DISTRIBUTION OF THE COUNTY AGENTS AND 4-H CLUB AGENTS ACCORDING TO TENURE

Intervals*	Frequency	
	County Agents	4-H Club Agents
Over 28	1	0
27 - 28	1	0
25 - 26	2	0
23 - 24	10	0
21 - 22	11	1
19 - 20	1	0
17 - 18	1	0
15 - 16	12	1
13 - 14	3	0
11 - 12	0	0
9 - 10	8	4
7 - 8	4	3
5 - 6	11	7
3 - 4	9	9
1 - 2	7	23
Total	81	48

* Intervals are in years of experience with the Michigan Extension Service as of May 1, 1951.

TABLE 6

THE MEANS AND STANDARD DEVIATIONS OF THE AGE AND TENURE OF THE COUNTY AGENTS AND 4-H CLUB AGENTS

Variable*	County Agents		4-H Club Agents	
	$\bar{X}$	σ	$\bar{X}$	σ
Age	42.73	9.35	33.17	7.87
Years of experience	12.90	8.26	4.19	4.01

* Age and years of experience are computed as of May 1, 1951.

Examination of these data reveals that the 4-H Club Agents are, in general, much younger than the County Agents. They have also been employed as extension agents for less time than have the County Agents. This difference in mean age and mean number of years of experience can be explained partly by the policy of the Michigan Extension Service regarding personnel selection and placement. Most of the new men employed by the Michigan Extension Service are first placed on the job as 4-H Club Agents. If they are successful in this work, and if they so desire, they are then advanced to the position of a County Agent. In other words, most of the men who are presently employed as County Agents first served as 4-H Club Agents.

In addition to the difference in mean age and tenure, it will be noted that both groups are highly variable with respect to age and years of experience. With respect to age, the County Agents ranged from 24 to 63 years of age, with a variance of 87.42. The 4-H Club Agents ranged from 23 to 60 years of age with a variance of 61.94.

Comparing these two groups with respect to variability in age results in an F of 1.41 which is not significant at either the 5 per cent or 1 per cent level.

With respect to years of experience, the County Agents ranged from one year to 35 years, with a variance of 68.23. The 4-H Club Agents ranged in years of experience from one year to 21 years with a variance of 16.09. Comparing these two groups with respect to variability in tenure results in an F of 4.24 which is significant at the 1 per cent level. Thus, it is revealed that the County Agents are considerably more variable with respect to years of experience than are the 4-H Club Agents.

Procedure for Gathering Data

The data necessary for this study were gathered during the period from April to August of 1951. The details of the procedure used in gathering the data relevant to the independent variables or the educational background are included below:

1. Permission was obtained from the Registrar of Michigan State College to use the transcripts of the men included in the sample who had attended Michigan State College. Permission was granted upon the condition that the records would remain anonymous in the study and that said records would not be made available to other persons outside of the Research Committee.

2. A data sheet was designed for recording the information to be taken from the transcripts. (See Appendix)

3. The transcripts of the individuals who had attended Michigan

State College were examined. The following data were copied onto the data sheet which had been prepared to facilitate this process: date of birth, degree and date, major, total undergraduate credits, total undergraduate honor points, number of credit hours in technical agriculture, technical agriculture honor points, and the number of credit hours of graduate work. These data were checked by two persons, the investigator and one other person.

4. Because some of the individuals included in the study had attended other colleges than Michigan State College, arrangements were made with the Director of the Michigan Extension Service to obtain from the personnel files a list of the colleges attended by each individual. It was necessary to contact each college or university that each individual had attended because, while the last institution attended by an individual would have the total credits and honor points earned by the individual, the credit hours taken at other colleges would all be figured into the total honor points as grades of "C." This total, then, would not be an accurate picture of the individual's level of achievement. In some cases it was necessary to contact as many as five institutions for the records of one individual.

5. A questionnaire was designed to be sent to the registrars of these institutions. The questionnaire was designed to obtain all of the academic information necessary for the achievement of the objectives of this investigation. (See Appendix)

6. A cover letter was composed and sent to the registrars with the questionnaires. This letter explained the objectives of the study, named the sponsors of the study, and asked for assistance in obtaining

the necessary data. It was decided that a personal letter to the registrars would elicit a more favorable response, so the letters were individually typed and signed. (See Appendix)

7. The registrars who did not return the questionnaires within three weeks or who sent incomplete questionnaires were sent a follow-up letter. In general, however, the response to the request for assistance was excellent.

8. Permission was obtained from the Board of Examiners of Michigan State College to have access to the test records of the individuals included in this study. Permission was granted upon the condition that the records would remain anonymous in the study. The scores of the individuals on the American Council on Education Psychological Examination were obtained from these test records.

9. Arrangements were made with the Secretary of the Board of Agriculture to obtain the date that each subject was appointed to the staff of the Michigan Extension Service. This information was necessary if an analysis was to be made of the relationship between tenure and the other criteria.

10. Later, all data, including the computed grade-point averages, were transferred to master data sheets that had been prepared for each subject. (See Appendix)

Procedure for Analysis of the Data

The procedure used in the analysis of the data for this research involved two types of research methodology, descriptive research and

prognostic research, as defined by Whitney.[1] The descriptive type of research involved making a check on the initial status of the academic variables in terms of an analytical and critical description.[2] The second type of research might be called predictive or prognostic because it involves the genetic, longitudinal point of view.[3]

Chapter VI involves the descriptive type of research. This part of the investigation is concerned with a description and analysis of the academic backgrounds of the County Agents and 4-H Club Agents included in the sample. Part one describes the amount of formal education that the agents have received and includes a comparison of the two groups of agents with respect to academic status. Part two includes the distribution of the agents according to decile rank on the ACE, plus a presentation of the range, arithmetic mean, and standard deviation of both groups of agents on the ACE. Similar descriptions and analyses are concerned with the all-college grade-point averages, technical grade-point averages and number of hours of technical agriculture for the County Agents and 4-H Club Agents. Part six describes the distribution of the agents into various college majors.

Chapters VII and VIII involve a specific type of predictive research because they are concerned with an analysis of the relationship between selected academic factors in the backgrounds of the agents and

---

[1] F. L. Whitney, The Elements of Research, New York: Prentice-Hall, Inc., 1942, Chapters VII and XI.

[2] Ibid., p. 152.

[3] Ibid., p. 166.

their present work effectiveness and job satisfaction, with the ultimate goal of using the results of such analysis for improving the guidance and selection of prospective extension workers. Because this analysis involves studying the relationship between variables determined at one period of time and variables determined at a later period of time, it has a genetic, longitudinal point of view. This part of the investigation can not accurately be called a research survey, for, as Whitney defines a survey, it is "an organized attempt to analyze, interpret, and report the present status of a social institution, group, or area."[4] Thus, while this group was studied to determine its present status with respect to work adjustment, the investigation goes beyond such a survey and investigates the relationship between what are frequently used as predictive variables and job satisfaction and work effectiveness.

Chapters VII and VIII considered two separate groups of extension workers, County Agents and 4-H Club Agents. Because these two groups of agents were considered separately, two parallel sets of statistical calculations were required. In addition, because two dependent criteria were considered in the study, work effectiveness and job satisfaction, it was necessary to run two parallel sets of statistical calculations for each of the separate groups of extension workers. The over-all statistical pattern, then, is as follows:

---

[4] Ibid., p. 155.

1. Work effectiveness (success on the job).
   A. County Agents
      1. "More successful" and "less successful" groups are compared with respect to the following variables:
         a. ACE scores
         b. All-college grade-point average
         c. Technical grade-point average
         d. Hours of technical agriculture
         e. College major
   B. 4-H Club Agents
      1. "More successful" and "less successful" groups are compared with respect to the following variables:
         a. ACE scores
         b. All-college grade-point average
         c. Technical grade-point average
         d. Hours of technical agriculture
         e. College major

II. Job satisfaction
   A. County Agents
      1. "More satisfied" and "less satisfied" groups are compared with respect to the following variables:
         a. ACE scores
         b. All-college grade-point average
         c. Technical grade-point average
         d. Hours of technical agriculture
         e. College major
   B. 4-H Club Agents
      1. "More satisfied" and "less satisfied" groups are compared with respect to the following variables:
         a. ACE scores
         b. All-college grade-point average
         c. Technical grade-point average
         d. Hours of technical agriculture
         e. College major

For the purposes of the above described analyses, each group of agents was divided into differential satisfaction groups and differential work effectiveness groups. After the agents had been rated by the Extension Administrators following the procedure described in Chapter V, in which rating they were each given a "quartile" ranking, the agents were divided into "more successful" and "less successful" groups of agents. The County Agents and 4-H Club Agents were not divided into equal groups for the purpose of analyzing the relationship

between the selected academic factors and work effectiveness. The Extension Administrators and the Research Committee decided that what they were most concerned with was differentiating the top three-fourths of the agents from the bottom one-fourth. Thus, the County Agents were divided into two groups of agents: 60 "more successful" agents and 21 "less successful" agents. The 4-H Club Agents were divided into two groups of agents as follows: 39 "more successful" agents and 9 "less successful" agents. A detailed analysis of the procedures used in dividing the agents into these differential success groups is included in Chapter V.

The County Agents and 4-H Club Agents were divided into differential job satisfaction groups on the basis of their scores on the Job Satisfaction Questionnaire. Because the scores made by the County Agents and 4-H Club Agents on this questionnaire were primarily grouped on the favorable end of the continuum with respect to attitude toward the job, it was decided by the Extension Administrators and the Research Committee that few if any agents could be classified as dissatisfied. Thus, instead of dividing the agents into "satisfied" and "dissatisfied" groups, it was decided to divide them into "more satisfied" and "less satisfied" groups of agents. The County Agents were divided into approximately equal satisfaction groups: 44 "more satisfied" County Agents and 37 "less satisfied" County Agents. The 4-H Club Agents were divided into two approximately equal satisfaction groups as follows: 26 "more satisfied" 4-H Club Agents and 22 "less satisfied" 4-H Club Agents. A detailed description of the Job Satisfaction Questionnaire, the study of scalability, and the division of

the agents into differential satisfaction groups is presented in Chapter V, Part II.

The differential satisfaction groups and differential success groups described above were compared by the same statistical procedures. First, they were compared on each of the first four variables with respect to difference in means, to determine whether the "more successful" agents were significantly different with respect to the means of these variables from the "less successful" agents and to determine whether there were any significant differences in differential satisfaction groups with respect to these four variables.

For example, the "more successful" and "less successful" groups of County Agents were compared with respect to difference in means on the ACE scores. This same procedure was then followed on each variable for each group of agents.

In each comparison, the differential groups were first tested for homogeneity of variance, since the t-test which is used to test the difference between means is based upon the assumption that the two samples have been drawn from the same population with respect to variance. The formula used to test for homogeneity of variance is the formula for Snedecor's F-ratio:[5]

$$F = \frac{\sigma_1^2}{\sigma_2^2}$$

The variances used in this formula (σ^2) are the unbiased estimates of the population variance. σ_1^2 is always the larger variance.

---

[5] Palmer O. Johnson, Statistical Methods in Research, New York: Prentice-Hall, Inc., 1949, p. 55.

If the F-test did not produce an F-value that was significant at the 5 per cent level, the next step was to apply Fisher's t-test to test the significance of the differences in means. The formula used for the t-test was:[6]

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{n_1 + n_2}{(n_1 + n_2 - 2)(n_1 n_2)}\left[(n_1 - 1)\sigma_1^2 + (n_2 - 1)\sigma_2^2\right]}}$$

In this formula, $(n_1 + n_2 - 1)$ represents the degrees of freedom.

Once the "t" was computed, referral was made to Fisher's table of values of "t"[7] in order to determine whether or not the computed "t" was significant at either the 5 per cent or the 1 per cent level.

In those cases where it was necessary to reject the null hypothesis stating that the two groups had been drawn from the same population with respect to variance, it was necessary to apply the Behrens-Fisher d-test.[8] This test of the significance of differences in means is designed specifically for use on samples that are not homogeneous with respect to variance. The formula used for the Behrens-Fisher d-test was:

$$d = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{\sum (X_1 - \bar{X}_1)^2}{N_1(N_1 - 1)} + \frac{\sum (X_2 - \bar{X}_2)^2}{N_2(N_2 - 1)}}}$$

In this formula, homogeneity of variance is not implied.

---

[6] E. F. Lindquist, Statistical Analysis in Educational Research, New York: Houghton Mifflin Company, 1940, p. 57.

[7] Ibid., p. 53.

[8] Johnson, op. cit., pp. 73-75.

For the purpose of analyzing the relationship between college major and work effectiveness or job satisfaction, it was necessary to use different statistical procedures than were used for the first four variables. For this part of the study, the agents were divided into fields of emphasis according to their college majors. The classification of various majors into larger fields of emphasis was done on the basis of similarities among the majors. The primary purpose for this combining of majors was to provide groups of agents large enough to justify statistical analysis. (See Table 30).

In studying the relationship between field of emphasis in college and job satisfaction, it was possible to consider using analysis of variance techniques, since there was qualitative data available, namely, scores on the Job Satisfaction Questionnaire. However, in the analysis of the relationship between field of emphasis in college and work effectiveness, analysis of variance was not possible because the criterion of work effectiveness did not yield a continuous variable, but groupings of individuals. As a result, Chi-square was used for this part of the study.

Before applying analysis of variance techniques to the groups of men who had majored in various fields of emphasis to determine whether or not there were any significant differences in measured job satisfaction among the groups, it was necessary to apply an appropriate test of homogeneity of variance. In this study, Bartlett's M-test was used, with the following formula:[9]

---

[9] Ibid., pp. 83-86.

$$-2 \log_e \nu = N \log_e \left[\frac{\sum_{t=1}^{k} (v_t s_t^2)}{N} \right] - \sum_{t=1}^{k} (v_t \log_e s_t^2)$$

$$N = \sum_{t=1}^{k} (v_t)$$

In this formula, s_t^2 is the unbiased estimate of σ_t^2 based on a sum of squares having v_t degrees of freedom and there are k independent estimates.

However, because the samples were small, Bartlett's corrective factor, "C", was used:[10]

$$C = 1 + \frac{1}{3(k-1)} \left\{ \sum_t \frac{1}{v_t} - \frac{1}{N} \right\}$$

Bartlett indicates that after the corrective formula has been applied, the resultant quantity follows approximately the Chi-square distribution.

In cases where this test of homogeneity indicated that the groups were not homogeneous with respect to variance, it was not possible to use analysis of variance methods because one of the basic assumptions involved in analysis of variance is homogeneity of variance among the groups. This necessitated the use of Chi-square in one case.

Where the M-test indicated that the groups were homogeneous with respect to variance, analysis of variance techniques were applied. The purpose of the analysis of variance in these cases was to determine whether the differences in mean satisfaction scores for the various field of emphasis groups were significant of real differences, or could be explained away in terms of chance fluctuations in sampling. The analysis of variance table used for these calculations is presented in Table 7 (page 95).

---

[10] Ibid., p. 84.

TABLE 7

ANALYSIS OF VARIANCE TABLE USED FOR TESTING DIFFERENCES IN MEANS OF VARIOUS FIELD OF EMPHASIS GROUPS [11]

Source of Variation	Degrees of Freedom	Sum of Squares	Estimate of Population Variance	F
Between Group	$r - 1$	$\Sigma T_p M_p - (GT)(GM)$	$\frac{ss}{r - 1}$	$F = \frac{\text{Est. Between}}{\text{Est. Within}}$
Within Group	$r(n - 1)$	$\Sigma X^2 - \Sigma T_p M_p$	$\frac{ss}{r(n - 1)}$	
Total	$nr - 1$	$\Sigma X^2 - (GT)(GM)$		

In the above table, r = the number of groups, ss = the sum of squares, n = the number in each group, GT = the total of all scores, GM = the mean score of the total group, T_p = total for each group, and M_p = the mean for each group.

If the calculated "F" is significant at the 5 per cent or 1 per cent level, the hypothesis that the differences in means can be attributed to chance variation is rejected. The customary statistical procedure is then to investigate the differences between individual combinations of two groups. Two groups are tested by the application of the Fisher t-test to determine whether the groups are significantly different.

---

[11] Lindquist, op. cit., Chapter V.

If the calculated "F" is not significant, there is no need for further statistical analysis, since any differences in the means of the groups can be attributed to chance variation.

Some of the ACE scores that were available were listed only as deciles. Because it was not possible to convert the decile scores to raw scores, and because there were no raw scores available for the tests, it was necessary to use all decile scores for the agents included in the study. These decile ranks are based upon the Michigan State College norms for entering freshmen. In order to normalize this data, the decile ranks were converted into T-scores.

In calculating grade-point averages, the following numerical values were assigned to each letter grade: A = 3, B = 2, C = 1, and D = 0. To compute the grade-point average for an individual, the following procedure was used:

1. The total number of credit hours that the individual had received at each grade was tabulated.
2. This total number of hours for each grade was multiplied by the numerical value assigned to that grade.
3. The sum of these calculations is his total number of honor points.
4. This sum was divided by the total number of credit hours that the individual had accumulated during his college career.
5. This result is the individual's grade-point average.

Summary of Chapter IV

The entire population of County Agents and 4-H Club Agents presently employed by the Michigan Extension Service, insofar as possible, was used as the sample in this study. Data relevant to the academic backgrounds of these individuals was gathered from the personnel files of the Michigan Extension Service, the personnel files of the Secretary of the Michigan State Board of Agriculture, the transcripts from the registrar's office at Michigan State College, the Board of Examiners' Test Information File, and the transcripts from the registrars of other colleges and universities. These data were then recorded on personal data sheets. These data were then analyzed according to appropriate statistical methods. The statistical methodology used in this study followed the forms set forth by Palmer O. Johnson, Jack W. Dunlap, and E. F. Lindquist.

CHAPTER V

THE WORK ADJUSTMENT CRITERIA

The primary concern of this chapter is to present the methods by which data were obtained relative to the work effectiveness and the job satisfaction of the County Agents and 4-H Club Agents, the treatment of these data, and the methods by which these agents were separated into variable work effectiveness and job satisfaction groups. The agents were divided into variable work effectiveness and job satisfaction groups in order to study the relationship between these two criteria and the academic backgrounds of the agents.

In order tc study the relationship between any prognostic measure and vocational adjustment, it is necessary to develop reliable, valid and specific measures of that vocational adjustment. Any research which attempts to validate predictive measures by studying the relationship between these measures and faulty criteria is in itself invalid. Thus, the practice of validating aptitude tests against grade-point average in an attempt to determine the vocational significance of the aptitude tests cannot be called sound unless those grade-point averages have themselves been ascertained to be accurate or valid prognostic measures of vocational adjustment.

Typical of this use of criteria with dubious validity were some of the studies made during World War II with AAF combat gunnery students. When these gunnery schools placed a great deal of emphasis

on being able to express verbally the operation of machine guns and turrets and being able to name the parts of the equipment, it was possible to devise verbal tests that could predict grades in gunnery school with a relatively high degree of success. It was found, however, that actual combat gunnery placed little emphasis upon verbalization. As a result, this type of training was replaced with more and more training in the actual maintenance, assembly, and firing of the guns. The nature of the grades in gunnery school no longer correlated with the above prognostic tests. It was therefore assumed by some investigators that selection by the prepared tests was probably based on chance variance in the training grades.[1]

It is highly improbable, however, that the ultimate criteria, (actual success on the job and job satisfaction) will ever be available for study. The next best thing, then, is to get as near as possible to these ultimate criteria. This approximation to the ultimate criteria is difficult to obtain on any job, and is even more difficult to obtain on complex jobs, such as the job of an extension worker, that involve varied activities and a combination of qualifications for success. Satisfactory criterion measures are not easily come by and when they are obtained, it must be remembered that they are still partial, since they give only an approximation to the ultimate goal toward which evaluation is directed.

Because the actual ultimate criteria are so elusive, it is

---

[1] Robert Thorndike, Personnel Selection, New York: John Wiley & Sons, 1949, pp. 125-126.

necessary to determine these ultimate criteria of success and job satisfaction rationally. With regard to success on the job, it is necessary for those who are in a position to judge the objectives of the job, the weight attached to the various objectives, and the behaviors which represent those objectives to reach an agreement as to the definition of the ultimate criterion of work effectiveness and, in many cases, to measure the degree to which the individuals on the job have met those objectives. In regard to job satisfaction, it is necessary to make use of as valid and reliable instruments for measuring the job satisfaction as are available. These are the goals toward which this investigator and the over-all Research Committee were striving in their gathering data relative to the work effectiveness and the job satisfaction of the agents included in this study.

The four main studies being conducted as a part of the over-all research project used the same criteria of work adjustment. Consequently, the plans for the evaluation of the agents, the gathering of data, the determination of the variable work adjustment groups, and the consequent analysis of data involved in the determining of the variable groups were the result of considerable cooperative action on the part of several members of the Research Committee.

The Criterion of Work Effectiveness

Some method of grading or evaluating the work of county extension workers was needed for this research project. Any method of evaluation of job performance assumes that there are differences in the way extension agents perform their jobs, and those differences

influence the effectiveness of the individual agents. However, consideration must also be given to the fact that other factors besides performance on the job influence the ultimate effectiveness of the agents. Such items as personality, general appearance, health, health of the agent's family, the social structure of the county in which he is operating and economic factors within the county will also play a part in determining the ultimate effectiveness of the agent. It is therefore necessary to consider more in the evaluation of extension agents than actual amount of time spent on various activities, type of performance on those activities, and such actual measurements of effectiveness.

Several very serious problems arose in connection with rating the work effectiveness of the agents. First, detailed time analysis of the way the agents spend their time revealed that seemingly equal work effectiveness between two agents did not mean that they were equally effective in various phases of their work. For example, it was discovered that among those agents who were considered to be fairly successful men by the extension administrators, there was considerable variation with respect to the way these agents organized and carried out their activities. In addition, there was considerable difference noted in the effectiveness with which they played their various roles. Second, it appeared that the job of an agent varied, depending to a great extent upon the county situation in which he was located. In other words, in some county it might be necessary to have considerably more ability as an organizer than in another county, while in still another county, the role of public speaker would receive considerably more stress than in adjacent counties. Thus, the various roles and

various duties of the agents were difficult to classify with regard to their importance in achieving the objectives of the extension program.

Rating Methods Considered

A possible method of approaching the problem of evaluating extension agents would be to determine the objectives of extension work and measure the degree to which each agent achieved those objectives. However, after careful examination of the general objectives of the Michigan Extension Service and the recommendations for their accomplishment, it was obvious that these objectives and methods were too general and inclusive to serve as a guide for rating and comparing the individual extension workers in the state of Michigan. It was thus necessary to consider more specific goals.

These broad objectives are usually translated into county goals and more definite objectives with the help of the local people. The agents, working with local committees, work out a definite plan of activities that lists these more specific objectives. Obviously, these plans vary from county to county. In one county the plan may call for the establishing of 20 fertilizer demonstrations, 10 meetings to be held on public policy, and so forth, and in another county the plan may call for no fertilizer demonstrations, but 20 septic tank demonstrations, 30 dairy meetings, and so on. Thus, although the broad objectives of all counties may be the same, the county programs that result from such cooperative planning with the local people will vary. This eliminated the use of such measurable goals as might be

found in the county plans of work in the construction of a rating scale for county extension workers on a state-wide basis.

The Research Committee considered carefully the possibility that farm people might be asked to rate extension workers. Favoring such a plan was the idea that if the objective of extension work is to help people, they should be the best judges of the kind of help rendered them. However, the Research Committee finally decided that this plan would not be feasible. First, most of the people asked to rate a county extension agent would have no basis for comparison between agents. They would know the work of the agent serving in their particular county but would have insufficient information about the work of the agents in the other 74 counties. Second, the sample of people to be selected to rate each agent would have to be representative of the entire population of the county. To select such a sample in all of the counties would in itself be a major research project beyond the resources available for the study.

Present System of Personnel Evaluation in Michigan

The Research Committee, having rejected the above methods, considered the rating system presently used by the Michigan Extension Service. Because the rating system used in this study was based upon this system, a summary of the procedures involved in it are included here.

The present system of evaluation in the state of Michigan is based upon the hypothesis that the two groups of people in Michigan who know the work of the many county extension agents most intimately are the extension specialists and the administrators of the Michigan

Extension Service. Thus, the annual system of evaluation utilizes the abilities of these people in arriving at the annual ratings of the agents upon which administrative actions as promotions and salary adjustments are based.

The ratings of the specialists. The specialists' ratings are based upon intimate contacts with the extension agents. The specialists are each responsible for extending the subject information in a particular field of knowledge, such as farm management, farm crops or dairy husbandry. In this activity they work closely with the county agents and have an opportunity to know the agents' work in their special project quite intimately. However, because some specialists do not work in every county during any one year, they are requested to rate only the programs in the counties where they have worked during the previous twelve months. As a result, during the present year, although there are 98 specialists, only 30 to 40 opinions were obtained on any one county program.

In order to have a uniform rating of the county agricultural programs, the following system of ratings or classifications was set up:

"A" (Superior) A county program to which this rating was assigned should show unusual accomplishment as compared to the other counties in which the same program is being carried on. The local people should evidence support of the program by active interest and participation.

"B" (Good) This classification denotes that the progress and accomplishments are satisfactory or better than average as compared to other counties. This rating is given to county programs which are constructive and which are supported by the public.

"C" (Fair) A rating of "C" is given to a program that could definitely be improved. This program might be one which has received little interest in the county as compared to other counties having similar needs for the same work. It might also indicate a poorly organized program or one in which the local support and participation is below average.

"D" (Poor) A county program given this rating might be one which is poorly conceived or unorganized and does not meet the needs of the local people. It might also be one on which no activity is apparent in the county. It might be that there is no local interest evident because of lack of knowledge about the program. A rating of "D" is given to a county project when progress towards accomplishing the objectives of the program is not at all satisfactory.

During each year each specialist rates his project in each county in which he has worked during the past year. These ratings are then recorded on an appraisal sheet by counties. Since a single county rating is desirable, a method was devised to combine the ratings given by the several specialists. It was not possible to simply give a numerical equivalent to the A, B, C, or D ratings because the importance of the various projects is not equal in all of the counties. For example, the rating of a dairy project in a county where 75 per cent of the farm income was derived from the sale of dairy products should receive more weight in evaluating the County Agent's effectiveness than the rating of the fruit program if less than 5 per cent of the farm income in that county came from the sale of fruit.

In order to correct this difficulty, the relative importance of the many projects are determined annually for each county. Each project in each county is assigned an importance grade: (1) of major importance, (2) of average importance, (3) of minor importance, and

(4) of no importance. The value of different farm commodities sold per county, as indicated by the latest census of agriculture, is used as a guide in this rating, but the final judgment is made by a group of seven administrators and specialists, based upon their intimate knowledge of the state and of the particular county. Then, differential weights are assigned to the specialists' ratings of their projects in each county according to the scale shown below:

Project Importance by Counties	Weights Assigned to Specialists' Ratings			
	A	B	C	D
Major	5	4	3	-5
Average	4	3	2	-3
Minor	3	2	1	-1
No Importance	0	0	0	0

According to this system of weighting, if a specialist rated the dairy program "A" and the dairy program was of major importance in the county, this rating would be scored 5 points. On the other hand, if another specialist rated the fruit program in that same county "D" and the fruit program was of minor importance in the economy of the county, this rating would be scored -1 according to the weight given in the above chart.

To arrive at a single score for each county, the weighted ratings are totaled for each county and then divided by the number of opinions obtained for each county. Then, for the purposes of comparison, the mean score for all of the counties in the state is determined. With

this average rating score for all counties representing 100 per cent, the score of each county is converted to a percentage of this composite score. The various county effectiveness percentages usually range from a low of approximately 70 per cent of average to a high of about 130 per cent of average.

These percentages represent the relative effectiveness of extension work in any given county, to the extent that the opinions of the specialists regarding the county program and the judgments of the men who determined the importance of the projects in each county are valid. Since the County Agent is responsible for the conduct of the county extension program, the percentage of average score for each county should reflect the effectiveness of individual agents. Consequently, this method is used as one of the standards for measuring the success of the County Agricultural Agents.

Appraisal of the 4-H Club projects. For practical purposes, it would be desirable to use identical criteria for determining the success of both groups of agents. However, inasmuch as the specialists work less directly with the 4-H Club Agents, it is not a valid procedure to use their ratings to evaluate work effectiveness in the 4-H Club program. Instead, a measure of the effectiveness of the 4-H Club program, as such, is used in the annual personnel evaluation.

Each year the state 4-H Club office receives a sum of money to be distributed to the various counties to be used as premiums and awards. The 4-H Club department, with the advice of county workers, have prepared a formula for the equitable distribution of this money to the various counties. Each 4-H Club project is given a money

value for each boy and girl completing the project. The established values for the various projects are as follows:

Beef, Swine, Dairy	$ 1.50
Sugar Beets, Sheep, Colt, and Junior Leadership	1.00
Corn, Beans, Potatoes, Forest Fire, Deer Yard, Pheasant, Market Garden, Forestry	.80
Home Gardens	.55
Landscape, Electrical, Food Preparation, Canning, Clothing, Ass't. Homemaker, Home Furnishing, Handicraft, Farm Machinery	.50
Wildflower, Soil Conservation, Bees, Wild Life, Farm Accounts	.40
Hot Lunch, War Activities, and all others	.25

At the end of each year, each county is allocated its proportionate share of the state money available for premiums on the basis of a formula similar to the above one which was used in 1949. By multiplying the number of boys and girls completing each project by the value in the above table, a money value is determined for each project in each county.

Extension administrators state that the value of the completed projects measure to some extent the intensity of training that is given to boys and girls enrolled in the different projects. This formula thus recognizes that it requires more ability and effort on the part of the 4-H Club Agent to carry a club member through some projects than it does others. Although there is no attempt to justify the value of the various projects in terms of what young people get

out of them, extension administrators claim that the total amount of money allocated to each county on this basis reflects to a certain degree the relative effectiveness of the 4-H Club Agents. The contact with the young people, they claim, is more intense in some projects than it is in others and it is therefore assumed that the more contacts and the more intimate or intense these contacts are, the more actual extension work is accomplished. For this reason, state allocations are considered as one measure of the 4-H Club Agents' work effectiveness.

The major difficulty involved in this measure of work effectiveness is involved in the variation, among counties, of the number of boys and girls eligible to participate in the 4-H Club program. In addition, there is a variation in the type of project best adapted to various county situations. These difficulties eliminate the possibility of making direct comparison of the 4-H Club Agents on the basis of state allocations. It is necessary to make comparisons within similar county situations. For this purpose, the counties of the state are divided into four groups. These groupings are made by a group of extension administrators, agricultural economists, and extension specialists who, in order to determine the desirability of work situations, group the counties on the basis of the following six factors: (1) number of farms, (2) number of commercial farms, (3) rural population, (4) urban population, (5) farm income average, and (6) area of the county.

After the counties are divided into four major categories according to desirability of the work situations, the average allocation

money for each group of counties is determined. The percentage of average is then calculated for each county within each group. This percentage of average is then used as one basis for the comparison of the work effectiveness of the 4-H Club Agents.

Another criterion used for measuring the work effectiveness of the 4-H Club Agents is the proportion of the rural boys and girls between the ages of 10 and 21 (ages of eligibility for 4-H Club work) enrolled in club work in each county.

The above described procedures indicate the present method of gathering data relative to the work effectiveness of the 4-H Club Agents. The final ratings of the 4-H Club Agents include the specialists' group ratings, the 4-H Club allocations ratings, and the rating arrived at by calculating the proportion of eligible boys and girls that are enrolled in 4-H Club work.

The final ratings of the extension agents. A study of the ratings obtained by the above described methods for the County Agents and the 4-H Club Agents indicated the need for careful interpretation of the results in light of all of the known factors which might influence them in any one year or which because of local conditions might invalidate them entirely. One example of the need for interpretation is the case of the agent whose wife had been ill during the past year, requiring almost constant attention by the agent. As a result, his program received a low rating, although the agent had been awarded a plaque the year before as one of the outstanding agents in the state. Consequently, the four District Extension Supervisors rate each agent within their respective districts in light of

all of the data available from the previously described methods. Because these supervisors work closely with their agents during the year, they have an opportunity to observe the agent at work and in addition understand the extenuating circumstances. The ratings of these four supervisors are then reviewed by the Director of Extension who assigns the final rating. This final rating is used for various administrative purposes, including promotion, change from one job to another, and salary adjustment.

Rating Method Used in This Study

The Research Committee decided that the best available method for measuring the work effectiveness of the individuals employed as County Agents and 4-H Club Agents would be the system used by the Michigan Extension Service for its annual personnel evaluation. It would have the advantage of being based upon previous observation of performance in specific situations. Procedures had been established for maintaining periodical records of performance which are necessary for any valid summary evaluations. It has the disadvantage of introducing the possibility of personal bias into the final evaluations when provisions are made to allow for external conditions such as were described in the rating procedure. It was determined, however, that the ratings obtained by this method would be as reasonable estimates of work effectiveness as would be possible within the financial limitations of the Research Committee.

One major difficulty arose in the use of the above rating system. This system made no attempt to include any particular number of agents

in any particular rating group. The Research Committee considered it advisable to have a fairly equal number of agents in the various work effectiveness groups and as a result decided that a separate forced ranking should be made by the extension administrators who made the annual ratings.

A panel of seven judges was chosen to participate in this rating. The panel consisted of the four District Extension Supervisors, the State Leader of Agricultural Extension, the State Leader of 4-H Club Extension Work, and the Director of Extension. These men were called together in a meeting by the Extension Training Specialist who carefully discussed with them the purpose of the rating and the methods which were to be used.

To make the ratings as objective as possible, each member of the panel was given a set of 4 x 5 cards with the name of a county worker typed in the upper left hand corner of each card. Seven sets of cards were prepared so that each rater would have a set of cards for the group of agents. Each set of cards was carefully shuffled before it was given to one of the raters. The raters were then instructed to divide the sets of cards into approximately equal halves, putting in one pile the cards of agents they would consider to be in the top half of the staff on over-all work effectiveness, and placing in the other pile the cards of agents they would rate in the bottom half of the staff on the same basis. When all of the judges had completed this step of the rating, they were each asked to divide each of these two piles into a top and a bottom half. In this way, each administrator divided the staff into four approximately equal groups.

After each judge had placed each worker's card into one of four stacks, the cards in each stack were numbered according to the ratings given to the agents: the men in the top fourth were assigned a "one"; the second fourth, a "two"; the third fourth, a "three"; and the bottom quarter, a "four." A tally was then made of the ratings assigned to each man by each judge. Thus, each man had seven ratings, one from each of the judges. The ratings for each man were then averaged in order to determine the final "quartile" rating.

Consistency of the Ratings

Table 8 (page 114) presents the range of averages used as arbitrary points of separation in order to arrive at four approximately equal groups, and the total average rating for each "quartile" group selected by this method. It also indicates the number of men in each group on whom there was unanimous agreement among the judges' ratings and total number of men placed in each "quartile" rating group.

From the data presented in Table 8, it is apparent that there was a relatively high agreement among the judges in most cases as to the over-all effectiveness of these agents. They tended, however, to have higher agreement about which men belonged in the top quarter and which men belonged in the bottom quarter than they did about which men belonged in the second and third quarters. In spite of this lack of extremely high agreement as to the work effectiveness of the men in the second and third quarters, it is apparent that the average rating of each man gave evidence that he should definitely be classified into one or the other of the groups.

TABLE 8

SUMMARY OF THE RATINGS OF COUNTY AGENTS AND 4-H CLUB AGENTS BY "QUARTILE" GROUPS

Classification	Range of Rating Averages	Total Average Rating of Groups	Unanimous Agreement	Total
County Agents				
First "Quartile"	.57 (1.00-1.57)	1.12	12	21
Second "Quartile"	.57 (1.71-2.20)	2.05	3	19
Third "Quartile"	.71 (2.57-3.28)	2.83	4	20
Fourth "Quartile"	.58 (3.42-4.00)	3.79	7	21
4-H Club Agents				
First "Quartile"	.42 (1.00-1.42)	1.19	5	13
Second "Quartile"	.71 (1.57-2.28)	1.98	2	13
Third "Quartile"	.57 (2.71-3.28)	2.92	3	13
Fourth "Quartile"	.43 (3.57-4.00)	3.74	1	9

Because eight of the 4-H Club Agents had been in the Extension Service for only nine months on May 1, 1951, arrangements were made to re-rate these men in August after they had been in the service for twelve months. When these men were re-rated, each judge assigned three of them the same ratings that he had assigned them in May. The other ratings were not as uniform as this, but proved to be quite uniform.

It will be noted that there are only nine 4-H Club Agents in the fourth "quartile" group. Originally there were twelve men in that group, but between the time of the ratings and the time that the Job Satisfaction Questionnaire was administered to the agents, three 4-H Club Agents left the Extension Service and had to be eliminated from the study. It is probably significant that all three of these agents had been rated in the lowest "quartile" group on work effectiveness.

Because inspection of the average rating for each of the agents might not reveal the actual variation among the judges, it was decided to analyze the ratings further. To check the amount of variation among the judges as to their assignment of ratings, these rating data were submitted to analysis of variance techniques suggested by Snedecor.[2] Tables 9 and 10 (page 116) present the results of this analysis.

---

[2] George W. Snedecor, Statistical Methods, Ames, Iowa: Collegiate Press, Inc., 1946, p. 256.

TABLE 9

ANALYSIS OF VARIANCE OF THE RATINGS OF SEVEN JUDGES ON THE WORK EFFECTIVENESS OF THE COUNTY AGENTS (N-81)

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F
Raters	6	2.4938	.4156	1.34 (a)
Individuals	80	569.1429	7.1143	23.02** (b)
Error	480	148.3633	.3091	
Total	566	720.0000		

(a) F for raters (1.34) not significant.
(b) F for individuals (23.02**) significant at the 1 per cent level or less.

TABLE 10

ANALYSIS OF VARIANCE OF THE RATINGS OF SEVEN JUDGES ON THE WORK EFFECTIVENESS OF THE 4-H CLUB AGENTS (N-48)

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F
Raters	6	2.1131	.3522	1.18 (a)
Individuals	47	297.1399	6.3221	21.18** (b)
Error	282	84.1726	.2985	
Total	335	383.4246		

(a) F for raters (1.18) not significant.
(b) F for individuals (21.18**) significant at the 1 per cent level or less.

Since the F-tests of the analysis of variances were not significant for the raters, it was possible to assume that there were no significant differences among the judges as to the mean ratings which they assigned to these two groups of agents, or that any difference in variation among them could be attributed to chance. However, the significant F-values found among the individuals indicate significant differences among the individuals being rated. Thus, the results found from these analysis of variances substantiate the conclusions that were made as the result of inspection of the average ratings of the agents.

It was decided that it would be advisable to obtain an estimate of the reliability of the ratings from these analysis of variances. In order to accomplish this, Hoyt's[3] method for estimating the reliability of a test by means of analysis of variance was applied to the rating data.[4] In Hoyt's method, the number of correct responses to each item on the test and the scores of each individual are the data used. In this method, the total sum of squares is divided into three parts: (a) between individuals, (b) between items, and (c) residual component or error. Then, by subtracting the sum of the squares among individuals and among items from the total, the residual sum of squares is used to estimate the difference between the true variance and the

---

[3] Palmer O. Johnson, Statistical Methods in Research, New York: Prentice-Hall, Inc., 1949, pp. 134-136.

[4] The applicability of this method to the rating data was confirmed by Dr. Paul L. Dressel, Chairman of the Board of Examiners, Michigan State College.

obtained variance.

In the present study, the variation among the raters is analogous to the variation among the test items in Hoyt's procedure and the variation among the individuals is analogous to the variation among the scores of each individual on the test. The correlation coefficients that resulted from the application of Hoyt's formula[5] were plus 0.956 for County Agents and plus 0.951 for 4-H Club Agents. One reason for these high coefficients is the fact that they represent the estimate of the reliability of an agent's rating based upon the composite rating by seven judges and not the reliability of an agent's rating by an individual rater. Thus, the coefficients indicate rather high reliability for the ratings.

In light of the fact that the average ratings for the individual agents indicated high agreement among the judges, because there was no significant variation among these seven judges as to the average ratings which they assigned to the agents, and because the estimates of reliability of the ratings were quite high, it was assumed that this rating provided a satisfactory measure of the work effectiveness of the County Agents and 4-H Club Agents included in this study.

Division into Variable Work Effectiveness Groups

The Research Committee discussed several possible groupings of the agents for comparative purposes: (1) comparing the top "quartile" group with the bottom "quartile" group, (2) comparing the top half of

---

[5] $r_{tt} = (a-c)/a$, where "a" equals mean squares between individuals and "c" equals mean squares between raters.

the agents with the bottom half of the agents, and (3) comparing the top three "quartile" groups with the bottom "quartile" group. Discussion with the Research Committee and the extension administrators brought out the fact that the extension administrators were of the opinion that the group of agents who might be considered unsatisfactory was small. This discussion also revealed that the major concern of the investigation should be to attempt to differentiate this small group of unsatisfactory agents from the rest of the group. This led to the decision that the lowest "quartile" groups of County Agents and 4-H Club Agents would most adequately represent that group of agents who might be classified as the unsatisfactory or, preferably, "less successful" or "less effective" group. As a result of this decision, the agents who were in the top three "quartile" groups were called "more successful" or "more effective."

This plan of comparison led to the following groupings of agents: 60 "more successful" County Agents and 21 "less successful" County Agents; and 39 "more successful" 4-H Club Agents and 9 "less successful" 4-H Club Agents. These groupings, then, are the basis of the comparisons made between variable work effectiveness groups and the selected academic factors.

Homogeneity of the Variable Work Effectiveness Groups

The homogeneity of these variable work effectiveness groups was determined with respect to age and years of experience with the Michigan Extension Service. Table 11 (page 120) presents the results of the appropriate tests of homogeneity on the County Agent groups.

TABLE 11

COMPARISON OF THE MEANS AND VARIANCES OF THE AGE AND YEARS OF EXPERIENCE FOR THE VARIABLE WORK EFFECTIVENESS GROUPS OF COUNTY AGENTS

Variable	"More Successful"		"Less Successful"		Tests of Homogeneity	
	$\bar{X}$	σ^2	$\bar{X}$	σ^2	F	t
Age	42.40	81.78	43.66	102.56	1.37	0.678
Years of Experience	12.72	57.47	13.43	96.75	1.68	0.337

This analysis revealed that the "more effective" County Agents did not differ significantly from the "less effective" County Agents with respect to mean age or mean years of experience with the Michigan Extension Service. Both groups of agents are highly variable, but they do not differ significantly between groups. This would indicate that the age of an individual and the number of years he had been with the service are not significantly related to his rated success.

Table 12 shows the results of the appropriate tests of homogeneity on the group of 4-H Club Agents.

TABLE 12

COMPARISON OF THE MEANS AND VARIANCES OF THE AGE AND YEARS OF EXPERIENCE FOR THE VARIABLE WORK EFFECTIVENESS GROUPS OF 4-H CLUB AGENTS

Variable	"More Successful"		"Less Successful"		Tests of Homogeneity	
	$\bar{X}$	σ^2	$\bar{X}$	σ^2	F	t
Age	33.00	64.56	33.89	49.87	1.29	.334
Years of Experience	4.15	15.36	4.33	19.11	1.24	.118

As was true of the County Agents, it is evident that the "more effective" 4-H Club Agents did not differ significantly from the "less effective" agents in terms of mean age or mean years of experience with the Michigan Extension Service. Again, the variable effectiveness groups are highly variable with respect to these two criteria, as they were in the case of the County Agents.

The Criterion of Job Satisfaction

Briefing the Agents

Some of the members of the Research Committee who were formerly County Agents suggested that it might be possible to elicit the highest degree of cooperation from the County Agents and 4-H Club Agents if a member of the Michigan Extension Service administrative staff initiated the request for participation and handled the details of gathering data from the agents. The other members of the committee agreed with this idea and as a result, John T. Stone, Extension Training Specialist and District Supervisor of the Extension Service, was asked to handle these details.

Early in the fall of 1950, all of the County Agents and 4-H Club Agents were contacted by Mr. Stone at their regular District meetings. At these meetings, the agents were informed of the plans for a study of the differential characteristics of extension workers. The various aspects of the over-all research project were explained to them and they were requested to participate in the achieving of the research objectives. In order to develop a cooperative attitude on the part

of the agents, the request was stated in terms of a need for their assistance in order to accomplish the objectives of the project.

Several other steps were taken to insure a receptive attitude on the part of the agents. First, they were assured that each of them would receive: a copy of the Hankes Report Form for Strong Vocational Interest Test - Men, with a letter giving instructions for interpreting the scores, an interpretation of his scores on the Minnesota Multiphasic Personality Inventory, and an interpretation of his answers to the Job Satisfaction Questionnaire. In addition, they were assured that their anonymity would be protected in the analysis of their tests and inventories. They were asked to sign their papers in order that each agent could receive his own scored answer sheet results, but were informed that as soon as possible, the answer sheets would be assigned a code number and their names would be removed from the sheets. The agents were also assured that the information gathered for the purposes of this investigation would have no bearing upon their present or future status with the Cooperative Extension Service.

The Job Satisfaction Questionnaire[6]

The Job Satisfaction Questionnaire used in this study is an adaptation of and extension of the Hoppock Job Satisfaction Blank. The Hoppock Blank was developed from a study of the responses of 500

---

[6] "Job Satisfaction Questionnaire" is the name assigned to the adaptation and extension of the Hoppock Blank. A copy of this blank is included in the Appendix.

teachers to approximately 200 questions.[7] Hoppock mailed out over 3,000 questionnaires during the school year of 1932-1933 and took the first 500 usable returns for use in his study. This study contrasted the responses of the 100 most satisfied teachers with the responses of the 100 least satisfied teachers. The four-item Blank that resulted from this investigation utilized four items that satisfactorily differentiated the two groups of teachers. This four-item Job Satisfaction Blank was then standardized on workers in New Hope, Pennsylvania, a town considered to be a fairly typical American manufacturing village. The study included 309 subjects, representing 88 per cent of the employed population of the town. Since that time, the Blank has been used in many studies of worker satisfaction.

In order to score the Hoppock Blank, a weight is assigned (one to seven) for each of the alternatives for each question. The individual's score for the Blank is the sum of the separate weights for each of the four questions. The individual is given a score for each question by taking the weight of the alternative answer that he has checked. This method of scoring the Blank was finally arrived at after it was discovered that a more complicated and supposedly more accurate method gave almost identical results. The correlation between these two methods of scoring was plus .98. Hoppock reports the split-half reliability of this four-item Blank to be plus .93.

Four of the seven items in the Job Satisfaction Questionnaire

---

[7] Robert Hoppock, Job Satisfaction, New York: Harper and Brothers, 1935, p. 47.

used for this study are taken directly from the Hoppock Job Satisfaction Blank. The three additional questions ask for self evaluations. More specifically, they are: "How well satisfied are you with your occupation?", "How enthusiastic are you about your occupation?", and "How interested are you in your work?". In addition to the seven questions in the blank, each question is followed by a question designed to measure the intensity of feeling the individual has related to the response on the question.

Three of the seven questions contain six possible answers for the subject to check, two items contain five choices, and two items contain four choices. The intensity items each contain three possible choices. In order to obtain a numerical score on the Job Satisfaction Questionnaire, each answer was assigned a numerical weight. The least favorable answer on each question was weighted as zero, the next more favorable answer was weighted as one, with more favorable answers ranging up to six depending upon the number of possible answers to the questions. The intensity questions were assigned weights ranging from zero to two, with zero representing the least intensity.

The total job satisfaction score for an individual on the basis of his answers to the Job Satisfaction Questionnaire would be a sum of the weights assigned to the answers which he had checked. The total intensity score would be figured in a similar manner.

The seven items included in this Job Satisfaction Questionnaire were selected on the basis of the results of a pilot study conducted

on a group of 100 teachers of vocational agriculture by Kenneth G. Nelson.[8] These teachers were asked to answer a 17-item questionnaire covering questions believed to be related to job satisfaction. Their answers to this questionnaire were submitted to scale analysis. The results of this analysis showed that seven of the items were scalable and thus were considered usable for this present study of job satisfaction.

Administration of the Questionnaire

During May and June of 1951, the questionnaires were sent out to the agents with accompanying cover letters. This cover letter, prepared by the Research Committee and Mr. Stone, once again assured the agents that all information from the questionnaires would remain anonymous and explained that although they were being asked to sign their names to the questionnaires, these names would be removed from the forms as soon as the completed forms had been received and had been assigned code numbers.[9] Personal follow-up letters were sent to those agents who did not respond immediately. As a result, questionnaires were received from the entire sample.

Scoring the Questionnaire

The Job Satisfaction Questionnaires were scored manually and checked by a second person. The assigned weight of the answer the

---

[8] Mr. Kenneth G. Nelson, Assistant Professor, Institute of Counseling, Testing, and Guidance, Michigan State College, conducted this study in 1950.

[9] A copy of this letter is included in the Appendix.

agent had checked on each question was written in the margin of the questionnaire. These weights were then added for the seven job satisfaction items to obtain the individual's total job satisfaction score. The totals for the accompanying intensity questions were found by adding the weights for the seven intensity items.

Distribution of the Job Satisfaction Scores

The distribution of the raw scores for the job satisfaction questionnaire is presented in Table 13 (pages 127, 128, 129) in the form of percentages of the County Agents and 4-H Club Agents who checked the various responses on the seven items on the questionnaire. Examination of the data presented in this table reveals that most of the responses were grouped toward the favorable end of the continuum. This means that few agents expressed dissatisfaction with their jobs. It is also apparent that the distribution of scores was rather narrow because of this grouping.

Scalability of the Job Satisfaction Questionnaire

In the present study, Guttman's "Cornell Technique for Scale and Intensity Analysis"[10] was used to determine whether or not the qualitative items represented in the job satisfaction scores were unidimensional. In other words, the Cornell Technique was applied in order to determine whether or not these scores could be expressed in a continuum and whether or not a point could be fixed upon this continuum that would separate those with positive and negative attitudes toward their jobs.

---

[10] Samuel A. Stouffer, Louis Guttman, et al., Measurement and Prediction, Princeton, New Jersey: Princeton University Press, 1950, 756 pp.

TABLE 13

PROPORTION OF COUNTY AGENTS AND 4-H CLUB AGENTS ANSWERING THE VARIOUS CATEGORIES ON THE SEVEN ITEMS ON THE JOB SATISFACTION BLANK

Items	Percentages	
	County Agents (N-81)	4-H Club Agents (N-48)
1. How well do you like your work?		
___I like it better than most anything else	30.9	20.8
___I like it very much	62.9	56.2
___I like it fairly well	6.2	20.8
___I'm indifferent to it	0.0	2.2
___I don't like it	0.0	0.0
___I dislike it a great deal	0.0	0.0
2. How much of the time do you feel satisfied with your occupation?		
___All of the time	9.9	6.3
___Almost all of the time	53.3	41.7
___Most of the time	33.3	35.4
___A good deal of the time	2.5	6.2
___Some of the time	0.0	10.4
___Very little of the time	0.0	0.0

TABLE 13 (Continued)

Items	Percentages	
	County Agents (N-81)	4-H Club Agents (N-48)
3. How do you feel about changing your occupation?		
___Would not consider changing	16.0	10.4
___Might consider changing to a closely related occupation	50.6	39.6
___Undecided	30.9	37.5
___Am not eager to change but would consider changing to a related occupation	0.0	2.1
___Would like to change to some related occupation	2.5	8.3
___Would like very much to get into a completely different occupation	0.0	2.1
4. How well satisfied are you with your occupation?		
___Much more satisfied than other people	14.8	25.0
___More satisfied than the average person	60.5	45.8
___As well satisfied as most people	23.5	27.1
___Less satisfied than the average person	1.2	0.0
___Much less satisfied than other people	0.0	2.1

TABLE 13 (Continued)

Items	Percentages	
	County Agents (N-81)	4-H Club Agents (N-48)
5. How enthusiastic are you about your occupation?		
___Very enthusiastic	32.1	43.8
___Quite enthusiastic	65.4	52.0
___Only mildly enthusiastic	2.5	4.2
___Not at all enthusiastic	0.0	0.0
6. How important do you think your work is as compared to that of other professional people?		
___Very important	76.6	77.5
___Quite important	22.2	22.5
___Slightly important	1.2	0.0
___Undecided	0.0	0.0
___Not important at all	0.0	0.0
7. How interested are you in your work?		
___Very interested	79.0	77.5
___Quite interested	21.0	22.5
___Only slightly interested	0.0	0.0
___Not interested at all	0.0	0.0

The hypothesis being tested by the application of this technique is: "The entire universe of items forms a scale for the entire population of people."[11] Guttman's criterion for accepting this hypothesis is: "The universe is said to be scalable for the population if it is possible to rank the people from high to low in such a fashion that from a person's rank alone we can reproduce his response to each of the items in a simple fashion."[12] The procedure used to test this hypothesis involves determining the extent to which rank order of the item responses for each question corresponds to the rank order of the individuals according to their total scores on the attitude measuring instrument.

If perfect scalability resulted on a questionnaire, the person or persons who ranked highest on total scores would also rank highest on each individual question of the questionnaire and the person who ranked lowest on total score would rank lowest on each individual item. Deviations from this rank correlation are called errors or "deviate" scores. The test of scalability is based on the percentage of error or on the percentage of reproducibility found by a ranking of the responses to each question. Either of these alternative percentages can be used.

Guttman suggests that for any attitude questionnaire to be considered scalable, the individual items on the questionnaire should have a reproducibility of at least 85 per cent, or have not more than 15 per cent error. In addition, the total scale should not have more than 10

---

[11] Ibid., p. 60.

[12] Ibid.

per cent error, or should have at least 90 per cent reproducibility.[13] Eysenk and Crown,[14] however, have concluded that Guttman's reproducibility criterion for total scale is too high. In a study of anti-Semitism attitudes in Great Britain, they submitted their investigation results to both factor analysis and scale analysis and found that if no individual item exceeded 20 per cent error and the error of the total scale was not greater than 15 per cent, the scale could be considered satisfactorily reproducible. The members of the Research Committee made a careful examination of the literature available on scale analysis and considered the applicability of both criteria to the data on job satisfaction in this study. The final decision made by the Research Committee was that the Eysenk and Crown criteria could be considered satisfactory for use in the present investigation.

Reproducibility is the principle test of scalability. However, according to Guttman, this is not enough. Consequently, in this study, the following essential additional criteria are used:[15]

(1) No item category should have greater error than non-error.

(2) At least some of the item categories should have marginal frequencies of between 40 and 60 per cent with few, if any, less than 10 per cent.

(3) The pattern of error should be random with no substantial number of non-scale types.

---

[13] Ibid., p. 77.

[14] H. J. Eysenk and S. Crown, "An Experimental Study in Opinion-Attitude Methodology," International Journal of Opinion and Attitude Research, 1949, Vol. 3, pp. 47-86.

[15] S. A. Stouffer, L. Guttman, et al., op. cit., pp. 77-80.

In applying Guttman's technique, the first step was to arrange the questionnaires in the order of the total raw score. Second, the scores for each question were tallied for each agent on a large chart on which the questions and the item categories for each question were listed across the top and the agents' identification numbers were ranked on the left from high to low in the order of their total raw scores. After the chart was completed, the array of scores was analyzed for the percentage of error as follows: the various item response categories for each question were combined into two categories on the basis of combinations which would result in a minimum of overlapping and error after a cutting point had been established between the two categories.

It is necessary to combine the categories because, as Guttman states, an item with four or five categories has seldom been found to be sufficiently reproducible unless the categories are combined.[16] The main reason for this is that the verbal habits of people are different. Guttman illustrates this by saying that some people may say "Agree" whereas others may say "Strongly Agree" when they have approximately the same position on the basic continuum. The difference in answers is the result of different verbal habits. The practice of combining categories to reduce error can be defended, states Guttman, if the categories are combined on the basis of being closely related.[17]

---

[16] L. Guttman, "The Cornell Technique for Scale and Intensity Analysis," Educational and Psychological Measurement, 1947, Vol. 7, p. 256.

[17] Ibid., p. 257.

TABLE 14

DICHOTOMIZATION COMBINATIONS OF JOB SATISFACTION ITEM RESPONSE CATEGORIES USED FOR TEST OF SCALABILITY

Item	County Agents		4-H Club Agents	
	Combinations of response categories into dichotomies			
	(1)*	(0)	(1)	(0)
1	(5)	(4,3,2,1,0)	(5,4)	(3,2,1,0)
2	(5,4)	(3,2,1,0)	(5,4)	(3,2,1,0)
3	(5,4)	(3,2,1,0)	(5,4)	(3,2,1,0)
4	(4,3)	(2,1,0)	(4,3)	(2,1,0)
5	(3)	(2,1,0)	(3)	(2,1,0)
6	not scalable		not scalable	
7	(3)	(2,1,0)	(3)	(2,1,0)

* The figures (1) and (0) indicate the weights of the combined categories.

Table 14 (page 133) shows how the item response categories were combined for the County Agents and the 4-H Club Agents. The responses to item 6 were so scattered for both groups of agents that a cutting point could not be established which would yield low enough error to meet the criteria of scalability. Examination of the data revealed that almost as many agents with low ranking on their total job satisfaction as with high ranking tended to answer this question favorably. Thus, it appeared that item 6 was not a discriminating item. It was, as a result, eliminated from further consideration.

Table 15 (page 135) presents the results of the scale analysis found by using the item categories in Table 14 and establishing for each question, cutting points in the rank order of the agents which allowed a minimum of overlapping of scores, e.g., a minimum of error.

Examination of these data in Table 15 reveals that items 1 and 3 for the County Agents are well over Guttman's individual item error maximum of 15 per cent, while items 2 and 5 are slightly over the maximum. Items 4 and 7, however, are under the maximum and therefore meet this criterion. For the 4-H Club Agents, items 1, 2 and 4 are within the maximum limits and thus meet the criterion, but items 3, 5 and 7 exceed the maximum per cent of error. It will also be noted that for both groups of agents, there is greater non-error than error in the array of scores by the dichotomization of item response categories shown in Table 14.

A second trial ranking of agents was then made in an attempt to reduce these percentages of error. This was done on the basis of the agents' new total scores which had been computed after assigning new weights to their item responses in terms of the dichotomized item response categories. Weights of 1 and 0 were assigned to the category combinations as listed under (1) and (0) in Table 14.

TABLE 15

SCALE ANALYSIS OF THE FIRST TRIAL RANKING OF THE SIX-ITEM JOB SATISFACTION QUESTIONNAIRE FOR COUNTY AGENTS AND 4-H CLUB AGENTS

Item	County Agents			4-H Club Agents		
	% of error	Non-error/error Categories		% of error	Non-error/error Categories	
		(1)	(0)		(1)	(0)
1	22.2	13/2	50/6	6.25	35/2	10/1
2	16.0	48/4	20/9	10.41	22/1	21/4
3	24.6	39/15	22/5	20.83	14/10	23/1
4	14.8	53/8	16/4	14.51	29/5	12/2
5	16.0	22/4	46/9	22.92	18/3	19/8
7	13.5	57/7	13/4	18.75	32/5	7/4
Total	17.9			11.95		

The results found through this re-ranking of the agents in accordance with their new total scores and by analyzing the extent to which their new item response scores on each question correspond to this new ranking are presented in Table 16 (page 137).

This re-ranking, as indicated in Table 16, resulted in a reduced percentage of error in the County Agent group for five of the six individual questions and for the total questionnaire responses. However, items 1, 2 and 3 are still above the Guttman criterion of 15 per cent maximum error, being 16, 17 and 19 per cent respectively. Nevertheless, inasmuch as they are within the Eysenk and Crown maximum criterion of 20 per cent they were considered acceptable for this study. Items 4, 5 and 6 are considerably below either criteria of maximum error percentage. In this County Agent group all of the categories have more non-error than error, the marginal frequencies are adequate (21 per cent is the lowest), and the pattern of error is reasonably random. The reproducibility of the total scale is 86.1 per cent which meets the Eysenk and Crown criterion.

Table 17 (page 138) presents similar data for the 4-H Club Agents. Examination of the data in this table shows that the results were considerably different for the 4-H Club Agents. The per cent of error remained the same in this re-ranking on item 7, but the per cent of error was higher for all other questions. The total error was also higher, resulting in 81.3 per cent of reproducibility, which is below the Eysenk and Crown criterion of 85 per cent. All of the categories have greater non-error than error, the marginal frequencies are satisfactory, and the pattern of errors is reasonably random. However, the reproducibility is such that it must be concluded that the job satisfaction attitudes expressed by the 4-H Club Agents in this questionnaire are not scalable.

TABLE 16

ILLUSTRATION OF THE SCALE ANALYSIS OF THE DICHOTOMIZED 6-ITEM JOB SATISFACTION QUESTIONNAIRE FOR THE SECOND TRIAL RANKING OF COUNTY AGENTS

Frequency	Questions 1 (1)	1 (0)	2 (1)	2 (0)	3 (1)	3 (0)	4 (1)	4 (0)	5 (1)	5 (0)	7 (1)	7 (0)	Score
12	x		x		x		x		x		x		6
7		(x)#	x		x		x		x		x		5
2	x		x			(x)	x		x		x		5
4	x		x		x		x			(x)	x		5
1	.x.....*			(x)	x		x		.x.....		x		5
11		x	x		x		x			x	x		4
1	(x)			(x)		(x)	x		(x)		x		4
3	(x)			(x)	x		x			x	x		4
3		x	x			(x)	x		(x)		x		4
4		x	x		x		x			x		(x)	3
3		x		(x)	x		x			x	x		3
3		x	x			(x)	x			x	x		3
1	(x)			(x)	x			(x)		x	x		3
1		x	.x.....		.x.....		....(x)			x	x		3
3		x	(x)			x		x		x	x		2
3		x		x	(x)			x		x	x		2
4		x		x		x	(x)			x	x		2
1		x	(x)			x	(x)			x		(x)	2
1		x		x	(x)		(x)			x	....(x)		2
1		x		x		x	(x)			x		x	1
2		x		x		x		x		x	(x)		1
3		x		x	(x)			x		x		x	1
1		x	(x)			x		x		x		x	1
1	(x)			x		x		x		x		x	1
5		x		x		x		x		x		x	0
Non-error	19	49	47	20	47	18	54	18	22	51	62	11	
Error	6	7	5	9	7	9	7	2	4	4	2	6	
Per cent error	16%		17%		19%		11%		09%		09%		
Marginal frequency per cent	31%	69%	64%	36%	67%	33%	75%	25%	32%	68%	79%	21%	

Total error = 68. Average item error = 11.3 or 13.9%
Reproducibility = 100 - 13.9 = 86.1%

x's parenthesized represent errors in item responses.
* Dotted lines across the items represent "cutting points."

TABLE 17

ILLUSTRATION OF THE SCALE ANALYSIS OF THE DICHOTOMIZED 6-ITEM JOB SATISFACTION QUESTIONNAIRE FOR THE SECOND TRIAL RANKING OF 4-H CLUB AGENTS

Frequency	Questions 1 (1)	1 (0)	2 (1)	2 (0)	3 (1)	3 (0)	4 (1)	4 (0)	5 (1)	5 (0)	7 (1)	7 (0)	Score
8	x		x		x		x		x		x		6
5	x		x		x		x			(x)#	x		5
1	x		x		x			(x)	x		x		5
5	x		x			(x)	x		x		x		5
2	x		....(x)*		x		x		.x.....		x		5
2	x			x		(x)	x		(x)		x		4
1	x			x	x		x			x	x		4
1	x		(x)			(x)	x			x	x		4
1	x		(x)		x			(x)	(x)			(x)	4
1	x		(x)		.x.....		.x.....			x		(x)	4
2	x			x		x	(x)			x	x		3
2	x			x		x		x	(x)		x		3
1		(x)		x	(x)			x	(x)		x		3
1	x			x	(x)			x		x	.x.....		3
1		(x)		x	(x)		(x)			x		x	2
1		(x)		x	(x)			x		x	(x)		2
1		(x)	(x)			x	(x)			x		x	2
1		(x)		x		x	(x)			x	(x)		2
1	x			x		x	(x)			x		x	2
3	x			x		x		x		x	(x)		2
1	.x.....			x		x		x	(x)		(x)		2
2		x		x		x	(x)			x		x	1
1		x		x		x		x		x	(x)		1
3		x		x		x		x		x		x	0
Non-error	37	6	19	23	20	16	25	13	16	20	31	8	
Error	0	5	4	2	4	8	8	2	7	5	7	2	
Per cent error	10.4%		12.5%		25.0%		20.8%		25.0%		18.7%		
Marginal frequency per cent	77%	23%	48%	52%	50%	50%	69%	31%	48%	52%	21%	79%	

Total error = 54, or 18.7% of total responses. Average item error = 9.
Reproducibility = 100 - 18.7% = 81.3%.

x's parenthesized represent errors in item responses.

* Dotted lines across item categories represent "cutting points."

Reliability of the Job Satisfaction Questionnaire

Investigators of attitudes show considerable concern over the reliability of their scales or questionnaires. Perhaps the best reason for this concern is stated by Krech and Crutchfield: "In order to be valid, measurements of beliefs and attitudes must be reliable, i.e., consistent."[18] With this in mind, an attempt was made to determine the reliability of the present Job Satisfaction Questionnaire. It must first be remembered that four of the seven items used in the present questionnaire are taken directly from the Hoppock Blank. These four items, as reported earlier in this chapter, have been found by Hoppock to have a split-half reliability of plus .93. In addition, Doob states, "In general, the more questions a scale has, the more reliable it is likely to be."[19] His reason for this statement is based on the reasoning that an individual's total score will be less affected, if he misunderstands one item, when the questionnaire is a longer one. Inasmuch as the questionnaire used in this study includes the four items of the Hoppock Blank which was highly reliable, plus three additional items, it might be suspected that the new questionnaire would be as reliable or even more reliable than the Hoppock Blank. However, it was deemed advisable to seek for more objective means of determining the reliability of the Job Satisfaction Questionnaire.

---

[18] D. Krech and R. S. Crutchfield, Theory and Problems of Social Psychology, New York: McGraw-Hill, Inc., 1948, p. 269.

[19] L. W. Doob, Public Opinion and Propaganda, New York: Henry Holt and Company, 1948, p. 186.

The best way to determine the reliability of an attitude questionnaire is to administer it a second time to the same group and then to study the differences. However, this method was considered impractical for several reasons: (1) the financial limitations of the Research Committee, (2) the time limitations upon the study would have necessitated giving the questionnaire with little time interval, which would have increased the likelihood that the answers to the second questionnaire would have been influenced significantly by what was recalled from the first test, and (3) the agents had already been asked to fill out so many blanks and test forms that the morale problem might influence the results.

Therefore, the reliability of the present questionnaire was determined by administering it once and then calculating the internal differences of the answers. The correlation thus found was then corrected by the use of the Spearman-Brown formula.[20] The resulting estimate of reliability is thus raised to the approximate one which would be obtained by the test-retest procedure. The maximum likelihood estimate[21] of the split-half reliability of the Job Satisfaction Questionnaire, when corrected by the Spearman-Brown formula, was found to be plus 0.71 for the County Agents and plus 0.69 for the 4-H Club Agents. This reliability that was found was Guttman's L_4 estimate of the "lower

---

[20] H. E. Garret, Statistics in Psychology and Education, New York: Longmans, Green, and Company, 1937, pp. 318-319.

[21] P. O. Johnson, Statistical Methods in Research, New York: Prentice-Hall, Inc., 1949, pp. 125-127.

bound" of the parameter value of the reliability coefficient.[24] It was an attempt to find the lowest possible measure that would come about if this questionnaire were given an infinite number of times to this group of agents. Neither of these estimates can be considered as indications of high reliability. One factor that might have influenced the reliability estimates was the restricted range of job satisfaction scores. Since few agents expressed dissatisfaction with their jobs, the answers were ranged along the favorable end of the job satisfaction continuum. Restricted range is frequently the cause of lower estimates of reliability for a questionnaire or examination. Kretch and Crutchfield state that, "It is a fairly common rule of thumb that the minimal adequate level of reliability is in the neighborhood of . . . . . 0.50 for group measurement."[22] Therefore, even with an attitude scale having a reliability as low as .50, it would be possible to arrive at useful conclusions about predictions . . ."[23] Thus, because these estimates of reliability, which resulted from analysis of the raw scores on the Questionnaire, are well above the minimal adequate level of reliability, they can be considered to indicate sufficient reliability for the purposes of this investigation.

---

[22] Kretch and Crutchfield, op. cit., p. 260.

[23] Ibid., p. 261.

[24] Stouffer, Guttman, et al., op. cit., pp. 300-311.

Validity of the Job Satisfaction Questionnaire

The validity of any measuring instrument is the degree to which it measures what it purports to measure. In this study, the validity of the Job Satisfaction Questionnaire would be the extent to which the answers that the individuals made to the questions about his attitudes indicate his actual attitudes about the matter. A careful review of the literature revealed no method that would directly ascertain the validity of an attitude scale. This investigator thus had to concur with Kretch and Crutchfield in their statement about measurement of attitudes: "There is . . . no direct mode of validation of measurements."[25]

Ascertaining the validity of adjustment questionnaires presents these problems especially since adjustment is an emotional factor and something that people cannot respond to in a purely objective light. People are apt to become biased, prejudiced or secretive when comtemplating their own adjustment. As a result, it is difficult to ascertain in any manner whether or not the responses to the scale reveal the real adjustment that exists.

What, then, are some of the methods of determining the validity of a measurement indirectly? One method of testing the validity of an attitude scale would be to predict from the measurement the individuals' future behavior.[26] If the measurements of the attitudes of the

---

[25] Ibid., p. 209.

[26] Ibid., p. 209.

individuals have been valid, it should be possible to accurately predict how they will behave toward the object of the attitude in future situations. However, as Remmers and Gage point out:[27]

> An attitude is seldom the sole determiner of behavior even in those situations to which the attitude seems most closely related. Other attitudes may work at cross purposes with the attitude which has been measured so that the resultant effect upon behavior is not what would be expected from knowledge of the single attitude.

In addition, Kretch and Crutchfield[28] and Murphy, Murphy, and Newcomb[29] assert that actions are no more valid than words, for action is just as frequently used to conceal real attitudes as are words. Thus, this method of determining validity has its weaknesses. That fact, combined with the fact that predictions and a follow-up to determine the accuracy of those predictions would involve more time and expense than were available for the purposes of the present investigation, eliminated this method of validation.

A second possible method of validating an attitude measurement would be to compare the results on the scale with the results of a different technique designed to measure the same attitude. However, Kretch and Crutchfield[30] point out that it can be argued with considerable justification that this approach is not really a validation

---

[27] H. H. Remmers and N. L. Gage, Educational Measurement and Evaluation, New York: Harper and Brothers, 1943, p. 398.

[28] Kretch and Crutchfield, op. cit., p. 266.

[29] G. Murphy, L. B. Murphy, and T. M. Newcomb, Experimental Social Psychology, New York: Harper and Brothers, 1937, pp. 889-912.

[30] Kretch and Crutchfield, op. cit., p. 264.

procedure, but another way of determining reliability. Finding that two measurements agree means merely that they agree and not necessarily that either one is measuring what it purports to measure.

Another method of determining by indirect methods the validity of attitude scales and questionnaires is to correlate the responses to the attitude scale with overt commitments of various kinds, such as membership in certain organizations, votes on elections, and so forth.[31] In the case of the extension workers included in this study, various observations about their behavior tended to substantiate the results on the questionnaire. For example, few of the agents expressed strong dissatisfaction. This is consistent with the fact that most of the agents have been on the job considerably more than one year while most of them because of their abilities, educational backgrounds, and training would have little difficulty finding other jobs with as good or better working conditions and remuneration. In addition, the fact that most of the agents were grouped on the satisfied end of the attitude continuum agrees with the results of the time studies recently completed by the Extension Service[32] showing that most agents spend considerably more time on their extension activities than do men in other types of work.

Remmers and Gage[33] point out one pitfall in using attitude scales

---

[31] Remmers and Gage, op. cit., p. 397.

[32] From data available in the Extension Service files.

[33] Remmers and Gage, op. cit., p. 399.

when they state that individuals may not be willing to be frank and honest about their attitudes. They then continue to point out that this difficulty can be overcome by establishing a high degree of rapport between the individuals whose attitudes are being measured and the person doing the measuring. In the present investigation, the difficulty was partly surmounted by having Mr. Stone, who has a high degree of rapport with the Michigan agents, contact the agents and request their participation in the study. In addition, the agents were assured that their responses would in no way influence their salaries, promotions or tenure, and that their names would be removed from the questionnaires to insure anonymity. The agents expressed their willingness to cooperate in the research project and somewhat verified their statements by expressing an active interest in learning about the results of the study.

For the above reasons, it was assumed that the verbal responses which were elicited from these agents were adequate measures of the verbal form which their feelings about the job take. This verbal expression of the attitude is, for all practical purposes, as close to validity as can presently be achieved.

Intensity Analysis

As pointed out by Kretch and Crutchfield,[34] a person's attitude is always characterized by a sign, as pro or anti, for or against the object. Because sign does exist in attitudes, it is therefore implied

---

[34] Kretch and Crutchfield, op. cit., p. 227.

that there must be a point on each scale or continuum where the sign changes. This point is called the zero point, or neutral position, of the scale.[35] On one side of this zero point attitudes grow more positive and on the other side they grow more negative. The determination of this zero point of attitude scales is important in the measurement of attitudes.

The zero point of attitude continua cannot be determined from the attitude questions on a scale.[36] Guttman also points out that rank order is not enough to distinguish between being favorable and unfavorable because it does not identify any point beyond which being more favorable actually means being favorable.[37] As a result, Guttman devised as part of his technique an intensity analysis which provides a cutting point in the rank order of the individuals such that the individuals to the right of that point on the continuum may be considered as "favorable" and to the left as "unfavorable" in their attitude toward an object or an issue.

The application of Guttman's intensity analysis to the scaled job satisfaction blank was the next step in the analysis of the job satisfaction data. This technique uses a separate intensity item after each attitude question. A weight is assigned to each alternative response,

---

[35] Ibid.

[36] Ibid., p. 229.

[37] L. Guttman, "The Cornell Technique for Scale and Intensity Analysis," Educational and Psychological Measurement, 1947, Vol. 7, pp. 247-279.

with zero indicating the least favorable response and a weight of two indicating the most favorable response. Item 5 is reproduced here to illustrate the application of this technique to intensity items on the Questionnaire.

5. How enthusiastic are you about your occupation?

___Not at all enthusiastic
___Only mildly enthusiastic
___Quite enthusiastic
___Very enthusiastic

How strongly do you feel about this?	Weight
___Not at all strongly	0
___Quite strongly	1
___Very strongly	2

Intensity analysis is a cross tabulation of the intensity score of the individual and the scaled score ranking of the individual or the "content" score. There is a natural or lawful relationship between the scale position that a person holds between the two extremes and the intensity of his attitude. A person holding an extreme attitudinal position is likely to feel more strongly about it than an individual who holds a less extreme opinion.[38] If this relationship were plotted on a graph, with the scale scores on the horizontal axis and the corresponding intensity values on the vertical axis, a U curve would result, with the intensities being highest at the extremes and lowest in the middle. Guttman makes this relationship between scale position and intensity the basis for his technique of establishing the zero point

---

[38] Kretch and Crutchfield, op. cit., p. 229.

of a scale.[39]

The curve formed by joining the median intensity scores with the scale position of the item forms the intensity component. As noted above, a U curve results, or at times, the curve takes the form of a J. The zero point of the scale is taken by Guttman as the point where the lowest part of the curve occurs. If a sharp point occurs in the curve, it indicates that the population is sharply divided on the issue. However, usually there is a region of relative indifference or neutrality resulting in a point that is not sharply defined.

Table 18 (page 149) shows the intensity analysis of the job satisfaction data for the County Agents. Examination of this data reveals that the left side of the U or J curve is missing. Because the curve does not turn upward at the left side, it is indicated that there is practically no strong job dissatisfaction among the present sample of County Agents. These scores are so distributed, however, that it was possible to arbitrarily classify the County Agents into variable job satisfaction groups. Thus, these scores were arbitrarily classified as follows: (1) Those agents with scores of zero or one (16 per cent) have low job satisfaction, (2) those individuals with scores of 2 or 3 (29.6 per cent) have medium or average job satisfaction and (3) those agents with scores of 4, 5 or 6 (54.4 per cent) have high job satisfaction.

---

[39] Ibid., p. 230.

TABLE 18

INTENSITY ANALYSIS OF THE SCALED JOB SATISFACTION QUESTIONNAIRE FOR COUNTY AGENTS

Intensity Scores	Scaled Content Scores 0	1	2	3	4	5	6	Total
12			1		2	3	4	10
11			1	2	6	2	(3)*	14
10	1	1	1	2	(5)	(4)	4	18
9	1	1	(3)	(2)	2	2	2	11
8		(3)	2	3	2	3		13
7	(3)		2	1	1			7
6		2	2	2			1	7
5		1						1
Total	5	8	12	12	18	14	12	81

* Numbers in parentheses are positions of median intensity scores.

Because the scores for the 4-H Club Agents indicated that the attitude was not scalable, it was not possible to submit this set of scores to intensity analysis.

Division into Variable Satisfaction Groups

The County Agents and 4-H Club Agents were divided into variable satisfaction groups for the purpose of comparing these differential groups with respect to the selected factors of academic background. Because few, if any, of the agents were dissatisfied with their jobs, the agents were divided into two fairly equal groups on the basis of their relative satisfaction, rather than dividing them into one group of satisfied agents and one group of dissatisfied agents. Thus, each group of agents, the County Agents and the 4-H Club Agents, were divided into "more satisfied" and "less satisfied" groups of agents.

The County Agents were separated on the basis of the scaled version of their content scores, inasmuch as they were found to be scalable when the Guttman technique was applied. Examination of the scaled scores revealed that 5 agents scored zero, 8 scored 1, 12 scored 2, 12 scored 3, 18 scored 4, 14 scored 5, and 12 scored 6. In attempting to divide the total group into relatively equal groups, the closest approximation to equal grouping resulted from dividing the group scores between scores 3 and 4. Using this point of division resulted in groups of 44 "more satisfied" County Agents and 37 "less satisfied" County Agents. This investigator realized that this was an arbitrary division, and indicated only that the "more satisfied" agents scored higher on the Job Satisfaction Questionnaire than did the other

group. However, assuming the validity of the Questionnaire, this division provided a basis for comparing two variable job satisfaction groups.

The 4-H Club Agents could not be divided by the same method because the responses of this group of agents to the Job Satisfaction Questionnaire failed to meet the requirements of the test of scalability. Thus, because the scaled scores could not justifiably be used for division purposes, it was necessary to examine the raw scores to determine the possibility of using these scores for dividing the 4-H Club Agents into variable job satisfaction groups. The raw scores of the agents indicated a considerable range of attitude toward their job, the scores ranging from 14 to 29. Thus, although these responses did not represent unidimensional attitudes, they did indicate various degrees of job satisfaction. It was therefore considered to be good procedure to use the distribution of raw scores presented in Table 19 (page 152) as the basis for dividing the 4-H Club Agents into variable satisfaction groups.

The closest approximation to equal grouping in the 4-H Club Agents resulted from dividing the total group of scores between the scores 22 and 23. Using this point of division resulted in the final grouping of 26 "more satisfied" 4-H Club Agents and 22 "less satisfied" agents. These, then, are the variable satisfaction groups used as a basis for comparing the more and less satisfied 4-H Club Agents with respect to the selected aspects of their academic backgrounds.

TABLE 19

DISTRIBUTION OF THE 4-H CLUB AGENTS' RAW SCORES ON THE JOB SATISFACTION QUESTIONNAIRE

Raw Score	Frequency
29	1
28	1
27	1
26	5
25	7
24	7
23	4
22	5
21	5
20	3
19	4
18	1
17	0
16	2
15	0
14	2
Total	48

Homogeneity of the Variable Satisfaction Groups

The homogeneity of these variable satisfaction groups was determined with respect to age and years of experience with the Michigan Extension Service. Table 20 (page 154) shows the results of the appropriate tests of homogeneity on the group of County Agents.

Examination of the data presented in this table reveals that the "more satisfied" County Agents had significantly more years of experience with the Michigan Extension Service than did the "less satisfied" agents, the former group having been on the job an average of 15.29 years, while the latter have been on the job an average of 11.4 years. This difference might indicate that those men who are most satisfied with extension work tend to remain on the job longer than those who are less satisfied with the job. On the other hand, it might indicate that the longer an individual stays on the job, the more he becomes satisfied with it.

Table 21 (page 154) shows the results of the appropriate tests of homogeneity on the satisfaction groups of 4-H Club Agents.

As was found to be true in the County Agents, it is evident that the "more satisfied" 4-H Club Agents have been on the job a significantly longer time than have the "less satisfied" agents. The former group had a tenure average of 5.26, while the latter group's average tenure was 2.90. However, in the case of the 4-H Club Agents, the "more satisfied" group was considerably more variable with respect to tenure than was the "less satisfied" group.

TABLE 20

COMPARISON OF MEANS AND VARIANCES OF THE AGE AND YEARS OF EXPERIENCE FOR THE VARIABLE SATISFACTION GROUPS OF COUNTY AGENTS

Variable	"More Satisfied"		"Less Satisfied"		Tests of Homogeneity	
	$\bar{X}$	σ^2	$\bar{X}$	σ^2	F	t
Age	43.70	83.75	41.37	92.58	1.10	0.04
Years of Experience	15.29	72.31	11.40	65.19	1.11	2.10*

*Significant at the 5 per cent level or less.

TABLE 21

COMPARISON OF MEANS AND VARIANCES OF THE AGE AND YEARS OF EXPERIENCE FOR THE VARIABLE SATISFACTION GROUPS OF 4-H CLUB AGENTS

Variable	"More Satisfied"		"Less Satisfied"		Tests of Homogeneity	
	$\bar{X}$	σ^2	$\bar{X}$	σ^2	F	t or d (a)
Age	34.65	78.00	31.40	42.73	1.83	0.63
Years of Experience	5.26	24.44	2.90	4.47	5.47**	2.20*

* Significant at the 5 per cent level or less.
** Significant at the 1 per cent level or less.
(a) The Behrens-Fisher d-test is used when the groups lack homogeneity of variance.

Relationship Between Work Effectiveness and Job Satisfaction

In order to study the relationship between work effectiveness and job satisfaction in these two groups of extension workers, the variable work effectiveness groups were compared with respect to means and variances of the raw scores on the Job Satisfaction Questionnaire. The results of this analysis are presented in Table 22.

TABLE 22

COMPARISON OF THE VARIABLE WORK EFFECTIVENESS GROUPS OF COUNTY AGENTS AND 4-H CLUB AGENTS WITH RESPECT TO RAW SCORES ON THE JOB SATISFACTION QUESTIONNAIRE

Agents	"More Successful"		"Less Successful"		Tests of Homogeneity	
	$\bar{X}$	σ^2	$\bar{X}$	σ^2	F	t or d (a)
County	(N-60) 23.86	5.30	(N-21) 22.52	10.56	1.99*	1.74
4-H Club	(N-39) 22.82	11.68	(N-9) 20.77	11.44	1.02	1.61

* Significant at the 5 per cent level or less.
(a) The Behrens-Fisher d-test is used when the groups lack homogeneity of variance.

These results indicate that the means of the job satisfaction scores were slightly higher for the "more successful" agents than they were for the "less successful" agents. However, these differences were not significant at either the 5 or the 1 per cent levels. These results indicated more clearly the need for separate studies relating academic backgrounds to these two variables, job satisfaction and work effectiveness, inasmuch as these variables are relatively independent criterion measures.

Summary of Chapter V

The present chapter has been concerned with a description of the methods used for determining the variable work effectiveness groupings and the variable job satisfaction groupings which were used as the basis for the comparisons involved in this research.

The method used in evaluating work effectiveness involved a rating by the subject matter specialists of the Michigan Extension Service, plus a final ranking by the panel of seven extension administrators in the case of the County Agents. The final ranking of the 4-H Club Agents by the panel considered the specialists' group ratings, the 4-H Club Allocations ratings, and the ratings arrived at by calculating the proportion of eligible boys and girls that are enrolled in 4-H Club work in each county. These various criteria were then interpreted in light of the additional information available to the extension administrators who served as judges. Each judge ranked each agent in one of four approximately equal "quartile" groups on the basis of their relative work effectiveness. There was high agreement among the judges on these ratings.

On the basis of these administrative ratings, the agents were divided into variable work effectiveness groups as follows: the top three-quarters were called "more successful" and the bottom quarter were called "less successful" in both groups of agents. These variable work effectiveness groups were found to be homogeneous with respect to age and years of experience on the job.

The agents were also measured for job satisfaction. The Job Satisfaction Questionnaire used in the study is an adaptation of the

Hoppock Job Satisfaction Blank, adapted by Mr. Kenneth G. Nelson and standardized on a group of 100 teachers of vocational agriculture. The reliability of the Questionnaire was found to be adequate for the study of group differences: the maximum likelihood estimate of the split-half reliability was plus .71 for the County Agents and plus .69 for the 4-H Club Agents when corrected by the Spearman-Brown formula. These are both well above the minimal adequate level of reliability necessary for group study.

In submitting the scores on the Questionnaire to a test of scalability, it was found that the job satisfaction scores were scalable (were unidimensional) for the County Agents, but not for the 4-H Club Agents.

Few of the agents, if any, expressed strong dissatisfaction with their jobs. Therefore, they were not divided into satisfied and dissatisfied groups of agents, but into relatively equal groups of "more satisfied" and "less satisfied" agents. These variable satisfaction groups were found to be homogeneous with respect to age, but the "more satisfied" County Agents and 4-H Club Agents were found to have been on the job a significantly longer period of time than the "less satisfied" agents.

Analysis of the relationship between work effectiveness and job satisfaction for this group of agents revealed that these two criteria were relatively independent.

CHAPTER VI

THE ACADEMIC BACKGROUNDS OF THE AGENTS

The present chapter is concerned with a description of the academic backgrounds of the agents included in this study. Included in this description are data relevant to academic aptitude, amount of education, college majors, amount of work in technical agriculture courses, grades received in college and grades received in technical agriculture courses. This investigator and the Research Committee felt that such a description would be valuable in understanding the beliefs, attitudes, behavior, personal adjustment, and work adjustment of the County Agents and 4-H Club Agents presently employed by the Michigan Extension Service.

The procedures used in gathering these data are described in Chapter IV.

Amount of Education

An important part of the description of the agents is the amount of education that the agents have completed. To complete this description, the agents were classified in four educational levels as follows: (1) no college work, (2) some college education, but not enough for a degree, (3) finished degree program, and (4) some graduate work. Table 23 presents the data relative to the amount of education that these agents have completed.

TABLE 23

THE AMOUNT OF EDUCATION THAT THE COUNTY AGENTS AND 4-H CLUB AGENTS HAVE COMPLETED

Educational level	County Agents		4-H Club Agents	
	Number	Per cent	Number	Per cent
No college work	3	3.70	0	0
Some college, but no degree	2	2.47	3	6.25
Finished degree program	76	93.83	45	93.75
Some graduate work*	21	25.93	9	18.75

* The agents who have completed some graduate work are also included in the group that have completed degree programs.

Examination of these data shows that 96.30 per cent of the County Agents have had some college education, while 93.83 per cent of them have finished degree programs. All of the 4-H Club Agents have had some college education and 93.75 per cent of them are college graduates. Only three agents did not attend college at all. Approximately 94 per cent of the total group of County Agents and 4-H Club Agents being studied are college graduates and approximately 23 per cent of the total group have completed some graduate work.

More complete analysis of the data revealed that one County Agent had received two undergraduate degrees and five County Agents had received Master of Science or Master of Arts degrees. Three 4-H Club Agents had received the above graduate degrees and one agent had received two undergraduate degrees plus a Master of Science degree.

Academic Aptitude

The American Council on Education Psychological Examination for College Freshmen was the test used in this study as the measure of academic aptitude. The ACE, as this examination is called in this study, is the only aptitude test given to all college students at Michigan State College. Thus, this test was the only available measure of academic aptitude on the County Agents and 4-H Club Agents who had attended Michigan State College.

Examination of the Board of Examiners' Test Record File at Michigan State College revealed that there were no test scores available before 1934. Thus, it was impossible to obtain test scores on any of the individuals who had started college at Michigan State College before that date. Many of the County Agents had started their college educations before 1934 and therefore did not take the ACE and did not have any test records. In addition, some of the agents who attended Michigan State College and had entered after 1934 had for one reason or another not taken the entrance examinations. Another limiting factor in gathering data relative to the academic aptitudes of the agents resulted from the fact that some of the agents who had attended colleges other than Michigan State College did not have test records available at those institutions. It was possible to obtain ACE scores for 26 County Agents, or 32.09 per cent of the sample of County Agents. It was possible to obtain ACE scores for 36 4-H Club Agents, or 74.99 per cent of that group. It was reported earlier in the study that the 4-H Club Agents are generally younger men than are the County Agents. This difference in age would account for the fact

that there were ACE scores available for more of the 4-H Club Agents. Because they are a younger group, a larger percentage of them started their college educations after Michigan State College had started its test record file.

The possibility of administering the ACE to those subjects for whom no test records were available was considered. However, examination of other researches revealed that this procedure would not be sound. Studies by Barnes[1] and Hunter[2] have demonstrated that comparing adults with the members of the normative group, college freshmen, would not be sound research methodology. Hunter discovered that 87 out of 105 college girls gained an average of 31 percentile points on the ACE from their freshman year to their senior year. The Barnes study showed similar changes. In addition, there are no tables available that would make it possible to accurately interpret the scores made by an adult group in terms of a college freshman group, or, for that matter, to accurately interpret the scores made by adults in any manner. Thus, the decision was made to study the data that were available.

There were two primary reasons for not administering a different aptitude test to the agents. First, the ACE is the test that is used as a prognostic measure by the Michigan Extension Service. Second,

---

[1] M. W. Barnes, "Gains in the A. C. E. Psychological Examination during the Freshman-Sophomore Years," School and Society, 1943, Vol. 57, pp. 250-252.

[2] E. C. Hunter, "Changes in Scores of College Students on the A. C. E. Psychological Examination at Yearly Intervals," Journal of Educational Research, 1942, Vol. 36, pp. 284-291.

the extension agents had already been asked to fill out so many blanks and questionnaires for this research project that it was deemed inadvisable to burden them with another test.

Table 24 (page 163) presents the distribution of the County Agents and 4-H Club Agents according to decile rank on the ACE. The range of decile rank was from the first decile to the ninth decile in both groups of agents, indicating that there are individuals included in the sample who would be considered by most college admission boards to be poor college risks, and, on the other hand, individuals who were in the top extreme of their entering freshmen classes. For the purposes of statistical analysis, the ACE scores were converted into T-scores. The mean decile standard score for the County Agents was 47.27, with a standard deviation of 7.77; the mean for the 4-H Club Agents was 45.53, with a standard deviation of 6.87. By converting these T-scores back to deciles, it was revealed that the averages would be at the fourth decile for both groups. It could thus be seen that the average individual who is presently employed as a County Agent or a 4-H Club Agent by the Michigan Extension Service was slightly below the average of entering Michigan State College freshmen students on the ACE.

The norms on the ACE that were used for this study were the norms for entering freshmen at Michigan State College. In order to compare the agents included in this study with a larger group of students, the Michigan State College norms were compared with the national norms published by the American Council on Education. This comparison revealed that the two sets of norms are similar each year. To facilitate such a comparison, Table 25 (page 164) presents the equivalent scores for 1941 and 1942 for the Michigan State College norms and the national norms.

TABLE 24

DISTRIBUTION OF THE COUNTY AGENTS AND 4-H CLUB AGENTS ON THE ACE

Decile	Frequency	
	County Agents	4-H Club Agents
10	0	0
9	1	1
8	3	1
7	4	2
6	1	7
5	5	6
4	4	3
3	2	5
2	2	6
1	4	5
Total	26	36

TABLE 25

EQUIVALENT SCORES FOR THE 1941 AND 1942 COLLEGE FRESHMAN EDITIONS OF THE AMERICAN COUNCIL ON EDUCATION PSYCHOLOGICAL EXAMINATION (ACE) FOR MICHIGAN STATE COLLEGE NORMS AND NATIONAL NORMS[3]

Decile	1941		1942	
	M.S.C.	National	M.S.C.	National
10	134 - up	139 - up	131 - up	135 - up
9	125 - 133	128 - 138	122 - 130	124 - 134
8	119 - 124	121 - 128	115 - 121	117 - 123
7	113 - 118	114 - 120	110 - 114	110 - 116
6	107 - 112	107 - 113	104 - 109	104 - 109
5	102 - 106	101 - 107	98 - 103	98 - 103
4	96 - 101	94 - 100	92 - 97	91 - 97
3	89 - 95	85 - 93	85 - 91	83 - 90
2	79 - 88	73 - 84	75 - 84	71 - 82
1	78 & down	72 & down	74 & down	70 & down

During the years of 1941 and 1942, as shown by the data presented in Table 25, the Michigan State College norms and the national norms are similar for the deciles 4, 5, 6 and 7. In the eighth, ninth and tenth deciles, the two sets of norms are still similar, but the

[3] National norms were taken from L. L. Thurstone and T. G. Thurstone, Psychological Examination for College Freshman 1942 Norms, American Council on Education, Washington, D. C., 1943.

Michigan State College norms were taken from records of the Michigan State College Board of Examiners.

raw scores are slightly higher for these deciles on the national norms. Inclusive scores for the Michigan State College norms tend to be a trifle higher for the first, second and third deciles.

Because the local norms and the national norms are so similar, it would be possible to state that because the samples included in this study are slightly below the average entering freshman at Michigan State College, they would also be slightly below average as far as academic aptitude is concerned when compared to all of the entering freshmen included in the American Council on Education normative groups. These national norms are based upon a minimum sample of 70,000 some entering freshmen in various colleges throughout the United States. The range of scores represented in this sample is fairly representative of the total range of scores made by college freshmen in the national normative group.

All-college Grades

In order to make statistical analysis possible, numerical values were assigned to each letter grade. These values are as follows: A = 3, B = 2, C = 1, D = 0. It was not necessary to assign a numerical value to the letter grade of "F" because there were no "F" grades included on the records of any of the agents. The numerical values used in this study for grades are the same as those assigned by the college registrar during the years prior to the fall of 1950 when a new system of "honor points" was instituted at Michigan State College. Because most of the agents who attended Michigan State College had completed their college degrees prior to the above date, the grade-

point averages computed by the registrar's office and recorded on the students' transcripts provided a check for the calculations made in this study.

The procedure used for computing grade-point averages is described in Chapter IV.

Table 26 (page 167) presents the distribution of the County Agents and 4-H Club Agents with respect to all-college grade-point averages. These data show that there was a wide range of grade-point averages. The actual averages ranged from .76 to 2.53 for the County Agents and from 1.00 to 2.44 for the 4-H Club Agents. Thus, grades ranged from C- to A- in the County Agent group and from C to B+ in the 4-H Club Agent group.

The mean grade-point average for the County Agents was 1.512 with a standard deviation of .356, while the mean grade-point average for the 4-H Club Agents was 1.498 with a standard deviation of .319. Considering the two groups together, the mean grade-point average is 1.507. Thus, the County Agents and 4-H Club Agents presently employed in Michigan averaged about half-way between a C and a B in their college courses.

The calculations on GPA were done on the group of 78 County Agents who had attended college and the total group of 48 4-H Club Agents, all of whom had attended college.

TABLE 26

DISTRIBUTION OF THE ALL-COLLEGE GRADE-POINT AVERAGES FOR THE COUNTY AGENTS AND 4-H CLUB AGENTS

Intervals	Frequency	
	County Agents	4-H Club Agents
2.40 - 2.54	3	1
2.25 - 2.39	0	1
2.10 - 2.24	3	0
1.95 - 2.09	3	3
1.80 - 1.94	6	1
1.65 - 1.79	9	5
1.50 - 1.64	13	10
1.35 - 1.49	14	12
1.20 - 1.34	14	8
1.05 - 1.19	6	4
.90 - 1.04	6	3
.75 - .89	1	0
Total	78	48

Grades in Technical Agriculture

Technical agriculture courses are those courses in agriculture that are offered at the Junior or Senior class level in college. Courses taken in agriculture at the Freshman and Sophomore levels are not included in this group of courses because they are generally introductory, general or survey courses and are not technical in content.

Seventy-four County Agents and 43 4-H Club Agents took courses in technical agriculture. The description included in this part of the study thus refers to these two groups of agents.

Table 27 (page 169) shows the distribution of the County Agents and 4-H Club Agents with respect to technical grade-point averages. These data reveal a wide range of averages in both groups of agents. The actual averages ranged from .97 to 2.79 for the County Agents and from 1.14 to 3.00 for the 4-H Club Agents. Thus, grades ranged from slightly less than a C in the County Agent group and slightly above a C in the 4-H Club Agent group to slightly less than a straight A average in the County Agent group and a straight A average in the 4-H Club Agent group.

The mean TGPA for the County Agents was 1.834 with a standard deviation of .177, while the mean TGPA for the 4-H Club Agents was 1.794 with a standard deviation of .451. Thus, the agents included in this study averaged slightly better in their courses in technical agriculture than they did in their total college courses. Considering the two groups of agents together, the mean TGPA was 1.819.

TABLE 27

DISTRIBUTION OF THE TECHNICAL GRADE-POINT AVERAGES FOR THE COUNTY AGENTS AND 4-H CLUB AGENTS

Intervals	Frequency	
	County Agents	4-H Club Agents
2.85 - 3.00	0	1
2.70 - 2.84	3	1
2.55 - 2.69	1	1
2.40 - 2.54	2	2
2.25 - 2.39	7	2
2.10 - 2.24	5	2
1.95 - 2.09	9	8
1.80 - 1.94	10	4
1.65 - 1.79	12	3
1.50 - 1.64	12	4
1.35 - 1.49	4	9
1.20 - 1.34	5	4
1.05 - 1.19	1	2
.90 - 1.04	3	0
Total	74	43

Hours of Technical Agriculture

Table 28 (page 171) shows the distribution of the number of hours of technical agriculture taken by the County Agents and 4-H Club Agents. Because those agents who had not attended college and had not taken any courses in technical agriculture plus those men who had attended college but had not taken any courses in technical agriculture are included in these data as having taken zero hours of technical agriculture, data are presented for 81 County Agents and 48 4-H Club Agents.

The number of hours of technical agriculture ranged from 0 to 82 for the County Agents and from 0 to 78 for the 4-H Club Agents. Inspection of Table 28 reveals that large numbers of both groups are concentrated in the range from 35 to 48. This concentration might be due to the fact that the number of hours required for most college majors is approximately 40. In both groups, the number of hours range from zero for some agents to approximately twice the number needed for a major for some agents.

The mean number of hours for the County Agents was 43.17 with a standard deviation of 18.27. The mean number of hours for the 4-H Club Agents was 35.90 with a standard deviation of 19.08. Thus, both groups are quite variable with respect to this factor. Since most of the individuals included in the study majored in agriculture, it would be expected that the mean number of hours would be in the neighborhood of the number of hours required for a college major.

TABLE 28

DISTRIBUTION OF THE NUMBER OF HOURS OF TECHNICAL AGRICULTURE TAKEN BY COUNTY AGENTS AND 4-H CLUB AGENTS

Intervals	Frequency	
	County Agents	4-H Club Agents
77 - 83	1	1
70 - 76	4	0
63 - 69	6	2
56 - 62	8	5
49 - 55	7	1
42 - 48	21	15
35 - 41	17	6
28 - 34	9	5
21 - 27	0	3
14 - 20	1	1
7 - 13	0	3
0 - 6	7	6
Total	81	48

College Majors

Of the 81 County Agents included in the study, 76 individuals completed degree programs and received either Bachelor of Science or Bachelor of Arts degrees. These 76 individuals majored in a wide variety of subject areas, although most of the college majors of these agents could be classified within the general area of agriculture. Only two of the agents who completed degrees received non-agricultural degrees.

Of the 48 4-H Club Agents included in this study, 45 individuals completed degree programs and received either Bachelor of Science or Bachelor of Arts degrees. Of these 45 agents who completed degrees, two agents received degrees without declaring any major, five received non-agricultural degrees, and the other 38 received degrees in a variety of fields of emphasis within the field of agriculture.

Table 29 (page 173) shows the way the County Agents and 4-H Club Agents were distributed according to majors. The data presented in this table indicated that more agents had majored in Animal Husbandry than in any other single major. There were 17 County Agents and nine 4-H Club Agents who had majored in this field. The next largest group was the group of agents who majored in Farm Crops, in which major there were 13 County Agents and three 4-H Club Agents. The next largest groups for the County Agents were the eight individuals who had Horticulture majors and the seven individuals who had Soils majors. The larger groups of agents in the 4-H Club Agents were the five men who majored in Agricultural Extension, the four who majored in Agricultural Education, and the four who majored in Dairy Products.

TABLE 29

DISTRIBUTION OF THE COUNTY AGENTS AND 4-H CLUB AGENTS ACCORDING TO THEIR COLLEGE MAJORS

College Major	Frequency	
	County Agents	4-H Club Agents
AGRICULTURE		
Agricultural Economics	4	1
Agricultural Education	3	4
Agricultural Engineering	1	3
Agricultural Extension	1	5
Agronomy	0	1
Animal Husbandry	17	9
Apiculture	1	0
Dairy Husbandry	2	1
Dairy Manufacturing	1	0
Dairy Production	3	1
Dairy Products	4	4
Dairy	1	2
Farm Crops	13	3
Farm Management	4	0
Forestry	0	2
Horticulture	8	2
Pomology	2	0
Poultry Husbandry	2	0
Soils	7	0
NON-AGRICULTURAL		
Biology	0	1
Chemistry & Physics	1	1
English	0	1
History & Political Science	0	1
Manual Arts	0	1
Physical Education	1	0
OTHERS		
No Major Declared	0	2
College, but no Degree	0	3
No College or just Short Courses	5	0
Total	81	48

TABLE 30

DISTRIBUTION OF THE COUNTY AGENTS AND 4-H CLUB AGENTS ACCORDING TO THEIR FIELDS OF EMPHASIS IN COLLEGE*

Code Number	Majors Included in the Area	Number of Agents	
		County Agents	4-H Club Agents
0	No College Work	5	0
1	Soils, Crops & Agronomy	20	4
2	Farm Management & Agricultural Economics	8	1
3	Animal Husbandry, Dairy, Dairy Husbandry, Dairy Products, Dairy Production, Dairy Manufacturing, & Poultry Husbandry	30	17
4	Agricultural Engineering & Farm Engineering	1	3
5	Horticulture, Pomology, & Apiculture	11	2
6	Agricultural Education	3	4
8	Forestry	0	2
9	Non-agricultural	2	10
11	Agricultural Extension	1	5
	Total	81	48

* This division of majors was completed with the assistance of John Stone, Specialist in Extension Training at Michigan State College.

Because many of the majors represented in Table 29 (page 173) are similar in content, and because the number of agents following each major was too small for statistical analysis, it was felt that the majors should be combined into larger groups of similar majors. Table 30 (page 174) shows the results of this combining of majors and the number of agents included in each field of emphasis.

Examination of the data presented in Table 30 reveals that certain areas of emphasis had considerably larger numbers of agents than did other areas. Group 3, which included Animal Husbandry, Dairy, Dairy Husbandry, Dairy Products, Dairy Production, Dairy Manufacturing, and Poultry Husbandry, included 30 County Agents and 17 4-H Club Agents as majors in that broad area. The next largest group was Group 1 which included Soils, Crops and Agronomy. Twenty County Agents and four 4-H Club Agents majored in these areas. Group 5, consisting of Horticulture, Pomology and Apiculture, included 11 County Agents and two 4-H Club Agents. The next largest group was the non-agricultural group of majors. There were two County Agents and 10 4-H Club Agents who could be included as non-agricultural students. In the non-agricultural group were those agents who had not declared any majors, those who had attended college an insufficient time to begin their majors in any specific area, and those who had majored in other fields of emphasis outside of the field of agriculture.

Summary of Chapter VI

This chapter has been concerned with a description of the following aspects of the academic backgrounds of the County Agents and 4-H Club Agents included in the study: amount of education, academic aptitude, all-college grades, amount of work in technical agriculture courses, grades in technical agriculture courses, and college majors.

Examination of the data relative to the amount of education that the various agents had completed revealed several important items. It was discovered that 96.30 per cent of the County Agents had some college education and 93.83 per cent of them had graduated from college. All of the 4-H Club Agents have attended college and 93.75 per cent of them are college graduates. Only three agents from the total group of 129 agents studied had not attended college at all. Approximately 94 per cent of the total group of agents are college graduates and approximately 23 per cent of the total group have completed some graduate work.

In studying the information available relative to academic aptitude, it was discovered that ACE scores were available on 26 County Agents and 36 4-H Club Agents. The range of decile ranks on the ACE was from the first decile to the ninth decile. The average County Agent was in the fourth "decile" group of his entering freshman class and the average 4-H Club Agent was also found to be at the fourth decile of his entering freshman class. Comparison of the Michigan State College norms with the national norms for the ACE indicated that these agents would be at approximately the fourth decile on the national norms.

Grade-point averages were computed on the basis of the following values for various letter grades: A = 3, B = 2, C = 1, and D = 0. The grade-point averages for all college courses ranged from .76 to 2.53 for the County Agents and from 1.00 to 2.44 for the 4-H Club Agents. The mean grade-point averages were 1.512 for the County Agents and 1.498 for the 4-H Club Agents. Thus the grades for these two groups of agents averaged about half-way between a C and a B.

There was also a wide range of grade-point averages in technical agriculture courses, for the 74 County Agents and 43 4-H Club Agents who took courses in agriculture offered at the junior and senior class level. The grades ranged from .97 to 2.79 for the County Agents and from 1.14 to 3.00 for the 4-H Club Agents. The mean technical grade-point averages were 1.834 for the County Agents and 1.794 for the 4-H Club Agents. Thus, the grades in technical agriculture courses were slightly higher than they were in all-college courses.

The number of hours that these agents had taken in technical agriculture ranged from 0 to 82 for the County Agents and from 0 to 78 for the 4-H Club Agents. The mean number of hours was 43.17 for the County Agents and 35.90 for the 4-H Club Agents.

Seventy-six of the 81 County Agents have received college degrees and 45 of the 48 4-H Club Agents have received college degrees. Considering the data available relative to the type of majors that these agents took in college revealed that most of the agents had majored in some area within the field of agriculture. Two of the County Agents

and seven of the 4-H Club Agents who had finished degree programs had majored in non-agricultural fields. The rest of the agents in these two groups of agents received degrees in a large variety of majors within the field of agriculture. The four majors that had the largest representation among the County Agents were: Animal Husbandry, Farm Crops, Horticulture and Soils. Among the 4-H Club Agents, the majors that had the largest representation were, in order of size: Animal Husbandry, Agricultural Extension, Agricultural Education and Dairy Products.

To facilitate statistical analysis, the majors were grouped into larger fields of emphasis, according to similarity of content and purpose.

CHAPTER VII

ANALYSIS OF THE DATA RELATING THE SELECTED ACADEMIC FACTORS TO RATED SUCCESS

Chapters VII and VIII are concerned with an analysis of the data available on the relationship between the various academic factors and the two measures of work effectiveness: measured job satisfaction and rated success. Separate studies have been made to determine (1) the relationship between the selected academic factors and measured work effectiveness (or success on the job), and (2) the relationship between the selected academic factors and the measured job satisfaction of the extension workers. These two studies are treated separately in Chapters VII and VIII.

The present chapter treats the area of rated success and the relationship between this criterion measure and five independent variables: (1) scores on the American Council on Education Psychological Examination, (2) all-college grade-point averages, (3) technical agriculture grade-point averages, (4) number of hours taken in technical agriculture, and (5) college majors or fields of emphasis in college. This chapter is divided into two parts. Part I deals with the County Agents and Part II concerns the 4-H Club Agents.

A Study of the Relationship Between the Selected Academic Factors and the Rated Success of the 81 County Agents

The major purpose of this part of the study was to determine the relationship between the five selected academic factors and the rated work effectiveness of the County Agents presently employed in Michigan. It was not possible to obtain all of the data for some of the County Agents. As a result, the samples involved in the analyses of data vary on the selected academic factors. When the number of agents for whom data was not available was large, an attempt was made to compare the group for whom data was available with the group without data to determine the advisability of interpreting the results as representative of the entire sample.

The supervisory ratings described in Chapter V divided the sample of 81 County Agents into relatively equal "quartile" groups with respect to work effectiveness. Joint discussion by the Research Committee and the Extension Administrators brought about the decision that the group of agents who might be considered unsatisfactory was a relatively small group. This discussion also revealed the point of view that the major concern of this research should be an attempt to differentiate this small group of unsatisfactory agents from the rest of the group. It was decided that the lowest quarter of the County Agents would most adequately represent that group who might be classified as unsatisfactory agents, or more preferably, "less successful" or "less effective." As a result of this decision, the plan for this part of the study has been designed to compare the top three-quarters of the group, or the 60 "more successful" County Agents, with the

bottom quarter, or the 21 "less successful" County Agents, with respect to the selected academic factors.

Comparison of the "more successful" and "less successful" County Agents with respect to scores on the ACE. As was pointed out before, there were ACE scores available for 26 of the County Agents. This sub-sample was studied first and then compared later with the rest of the County Agents to determine the homogeneity of the two groups. These 26 scores were distributed between the variable success groups in approximately the same proportion as were the total group of agents. There are ACE scores available for 19 "more successful" County Agents and seven "less successful" County Agents. Table 31 (page 182) shows the distribution of these decile ranks for the County Agents, divided according to the differential success groups.

It will be noticed that 17 of the 26 County Agents were in the lower half of their Freshmen classes. Weintraub and Salley[1] reported that 24 per cent of the group of 1,064 students studied who were in the lower half of their classes were dropped from school during the four year program. However, all 26 of these County Agents graduated from college.

Further examination of the data in this table reveals that five of the seven "less successful" agents ranked above the fourth decile, while the other two agents were at the first decile. In the "more

---

[1] R. G. Weintraub and R. E. Salley, "Graduation Prospects of an Entering Freshman," Journal of Educational Research, 1945, Vol. 39, pp. 116-126.

TABLE 31

DISTRIBUTION OF THE DECILE RANKS ON THE ACE FOR COUNTY AGENTS, DIVIDED ACCORDING TO THE DIFFERENTIAL SUCCESS GROUPS

Decile	Frequency		
	"More Successful"	"Less Successful"	Total
10	0	0	0
9	1	0	1
8	2	1	3
7	2	2	4
6	1	0	1
5	3	2	5
4	4	0	4
3	2	0	2
2	2	0	2
1	2	2	4
Total	19	7	26

successful" group, the individuals were scattered over the entire range of scores.

A statistical comparison of the ACE scores of the 19 "more successful" and seven "less successful" County Agents is shown in Table 32 (page 184). The two groups were first compared with respect to variance by the application of Snedecor's F-ratio. The computed F-value was not significant at the 5 per cent level, indicating that any difference in variance could be attributed to chance. Then, the t-test, which assumes this homogeneity of variance, was applied to test the significance of the differences in the two means. The derived t-value was not significant at the 5 per cent level, indicating that the two means were not significantly different. From this evidence it was possible to conclude that in this sample of 26 County Agents, academic aptitude did not influence work effectiveness as measured by the administrative ratings.

This lack of relationship between academic aptitude and work effectiveness is in keeping with the findings of Anderson[2] and Moore[3] who both found intelligence tests to have little predictive value in sales work. Many attempts to predict success in teaching have met

---

[2] V. V. Anderson, Psychiatry in Industry, New York: Harper and Brothers, 1929, p. 46.

[3] H. Moore, Psychology for Business and Industry, New York: McGraw-Hill and Company, 1942, Ch. 16.

TABLE 32

COMPARISON OF THE "MORE SUCCESSFUL" AND "LESS SUCCESSFUL" COUNTY AGENTS WITH RESPECT TO ACE SCORES

Statistic	"More Successful"	"Less Successful"
N	19	7
$\bar{X}$ (a)	47.26	47.29
σ (b)	7.325	9.517
σ^2	53.65	90.57
	F = 1.69	
	t = .00855	

(a) The decile ranks were converted to T-scores.
(b) Unbiased estimates of the population variance and standard deviation.

(Neither of the above tests of homogeneity is significant at the 5 per cent level).

with similar results. Rolfe,[4] Seagoe[5] and Jones[6] studied the relationship of the ACE to success in teaching and all found extremely low correlations between the two measures. Much of the work of a County Agent is similar to teaching in the classroom, and thus the same contingency factors that lead to a lack of relationship in teaching might also lead to the lack of relationship in the work of a County Agent. Most of the studies in business and industry that were reviewed in Chapter III revealed a positive relationship between intelligence and success on the job. Significant relationships were found in the following types of work which are similar to the work of the County Agent: branch office managers for a personal finance company,[7] administrative Civil Service employees,[8] and supervisors in a rubber plant.[9] All of these types of work are administrative and

---

[4] J. F. Rolfe, "The Measurement of Teaching Ability: Study Number Two," Journal of Experimental Education, 1945, Vol. 14, pp. 52-74.

[5] M. V. Seagoe, "Prognostic Tests and Teaching Success," Journal of Educational Research, 1945, Vol. 38, pp. 685-690.

[6] R. D. Jones, "Prediction of Teaching Efficiency from Objective Measures," Journal of Experimental Education, 1946, Vol. 15, pp. 85-89.

[7] S. N. Stevens and E. F. Wonderlic, "The Relationship of the Number of Questions Missed on the Otis Mental Tests and Ability to Handle Office Detail," Journal of Applied Psychology, 1934, Vol. 18, pp. 364-368.

[8] T. L. Bransford, et al, "A Study of the Validity of Written Tests for Administrative Personnel," American Psychologist, 1946, Vol. 7, p. 279.

[9] Joseph Tiffin and C. H. Lawshe, Jr., "The Adaptability Test," Journal of Applied Psychology, 1943, Vol. 27, pp. 152-163.

supervisory in nature and in that sense they are similar to the County Agent's work. Perhaps the explanation of why significant relationships were found in these groups and not for the County Agents can be summed up in the conclusions reached by Bingham and Davis[10] after they had studied 102 business executives to determine the relationship between intelligence and success and had found a correlation of -.10. They concluded that intelligence, above a certain minimum, contributes relatively less to business success than do other non-intellectual traits of personality. The minimum academic aptitude represented in the group of 26 County Agents studied was sufficient to allow them to be admitted to college and have a relative amount of success in college, for all of them graduated.

Because ACE scores were not available for 55 of the 81 County Agents, this investigator decided to compare the group without ACE scores with the group for whom ACE scores were available to determine the advisability of interpreting the above results as being representative of the entire group of County Agents. Table 33 (page 187) presents the results of comparing the two groups with respect to age, tenure, all-college grade-point average, and technical grade-point average.

In addition to comparing the two groups with respect to the

---

[10] W. V. Bingham and W. G. Davis, "Intelligence Test Scores and Business Success," Journal of Applied Psychology, 1924, Vol. 8, pp. 1-22.

TABLE 33

COMPARISON OF MEANS AND VARIANCES OF THE AGE, TENURE, ALL-COLLEGE GRADE-POINT AVERAGE (GPA), AND TECHNICAL GRADE-POINT AVERAGE (TGPA), FOR THE GROUPS OF COUNTY AGENTS WITH AND WITHOUT ACE SCORES

Variable	Without ACE Scores		With ACE Scores		Tests of Homogeneity	
	$\bar{X}$	σ^2 (a)	$\bar{X}$	σ^2	F	t or d (b)
Age	46.09	62.91	33.73	28.44	2.21*	9.33**
Tenure	16.20	57.98	6.69	36.94	1.57	6.01**
GPA	1.53	.151	1.47	.081	1.86*	2.37*
TGPA	1.83	.158	1.85	.187	1.18	.23

(a) Unbiased estimates of population variance are presented.
(b) Behrens-Fisher d-test used when groups lacked homogeneity of variance, or F-test was significant.

* Significant at the 5 per cent level.
** Significant at the 1 per cent level.

above four variables, they were also compared with respect to work effectiveness and job satisfaction. The Chi-square distribution was used to determine whether the group of agents for whom no ACE scores were available and the group of agents for whom scores were available were fundamentally homogeneous with reference to measured job satisfaction and rated work effectiveness. The results of these tests of homogeneity are presented in Table 34.

TABLE 34

COMPARISON OF THE GROUPS OF COUNTY AGENTS WITH AND WITHOUT ACE SCORES WITH RESPECT TO RATED WORK EFFECTIVENESS AND MEASURED JOB SATISFACTION

	With ACE Scores	Without ACE Scores	Chi-square
	N	N	
WORK EFFECTIVENESS			
More Successful	19	41	.0198
Less Successful	7	14	
Total	26	55	
JOB SATISFACTION			
More Satisfied	10	34	3.88*
Less Satisfied	16	21	
Total	26	55	

* Significant at the 5 per cent level.

The tests of homogeneity used in comparing these two groups of County Agents revealed that the differences in age and tenure of those agents with ACE scores and those agents without ACE scores would be exceeded in less than 1 per cent of similar samples that were randomly selected. The agents for whom no scores were available were older and had been on the job longer than the other group. This difference was to be expected because the major reason for not being able to obtain ACE scores upon the majority of County Agents was the fact that many of them had attended college before 1934, when Michigan State College test records began. Thus, the two groups are not similar with respect to these two variables. In some ways this is advantageous for future selection and guidance purposes. The sample studied is younger and therefore is more like the young men who are considering extension work as a career and are being considered for jobs with the Michigan Extension Service. But, for the purposes of this study, the sample of 26 agents for whom ACE scores were available are not representative of the entire group with respect to age and tenure.

The differences that existed between these two groups with respect to all-college grade-point averages and measured job satisfaction were large enough so that they would be exceeded in less than 5 per cent of similar random samples, indicating that they were not highly homogeneous with respect to these two variables. Thus, although the two groups were found to be homogeneous with respect to technical grade-point averages and rated work effectiveness, this

investigator concluded that the 26 County Agents for whom ACE scores were available could not justifiably be considered as representative of the entire group of County Agents until further observations have been made relative to the academic aptitude of the County Agents employed in Michigan.

Comparison of the "more successful" and "less successful" County Agents with respect to all-college grade-point average. All-college grade-point averages were available for all of the 78 County Agents who attended college. These 78 agents were classified according to differential success groups as follows: 57 "more successful" agents and 21 "less successful" agents. Table 35 (page 191) shows the distribution of these GPA's for the County Agents, divided according to differential success groups. The actual range of the GPA was from .76 to 2.53, indicating that a wide range of scholarship was represented in this group of individuals.

Table 36 (page 192) shows the results of the comparison of the differential success groups with respect to all-college grade-point average. The computed F-value was significant at the 5 per cent level, indicating that the two groups may be significantly different with respect to variance, but further observations are necessary to confirm this lack of homogeneity. This suspected lack of homogeneity made it advisable to use the Behrens-Fisher d-test to test the significance of the difference in the two means.

The derived d-value was not significant at the 5 per cent level, indicating that the variable success groups were not significantly

TABLE 35

DISTRIBUTION OF THE ALL-COLLEGE GRADE-POINT AVERAGES FOR COUNTY AGENTS, DIVIDED ACCORDING TO DIFFERENTIAL SUCCESS GROUPS

Intervals	Frequency		
	"More Successful"	"Less Successful"	Total
2.40 - 2.54	2	1	3
2.25 - 2.39	0	0	0
2.10 - 2.24	2	1	3
1.95 - 2.09	2	1	3
1.80 - 1.94	1	5	6
1.65 - 1.79	7	2	9
1.50 - 1.64	11	2	13
1.35 - 1.49	13	1	14
1.20 - 1.34	11	3	14
1.05 - 1.19	5	1	6
.90 - 1.04	3	3	6
.75 - .89	0	1	1
Total	57	21	81

TABLE 36

COMPARISON OF THE "MORE SUCCESSFUL" AND "LESS SUCCESSFUL" COUNTY AGENTS WITH RESPECT TO ALL-COLLEGE GRADE-POINT AVERAGE

Statistic	"More Successful"	"Less Successful"
N	57	21
$\bar{X}$	1.50	1.544
σ (a)	.3244	.4399
σ^2	.1052	.1935
	F = 1.85*	
	d = .410 (b)	

(a) Unbiased estimate of the population standard deviation and variance was calculated.
(b) Because the calculated "F" was significant, Behrens-Fisher d-test was used.

* Significant at the 5 per cent level.

different with respect to mean GPA. In other words, the quality of the grades that these individuals received in college was not significantly related to their work effectiveness ratings.

This lack of relationship between grades and success is in agreement with the results found in most attempts to predict success in teaching from college grades. Seagoe[11] correlated the grade-point averages of 25 teachers with their rank on the high school staff after two years of teaching and found a correlation coefficient of .03. Jones[12] found coefficients of .24 between grades and a pupil gain rating of teachers, and .24 between grades and supervisory ratings. Kriner[13] found the highest correlation between grades and supervisory ratings. For graduates of the two-year program the coefficient was .401; and for graduates of the four-year program the coefficient was .451. However, in general, the results of prognostic studies in teaching have agreed with the findings of the present study.

Comparison of the "more successful" and "less successful" County Agents with respect to technical grade-point average. Technical grade-point averages were obtained for 55 "more successful" County Agents and

---

[11] M. V. Seagoe, "Prognostic Tests and Teaching Success," Journal of Educational Research, 1945, Vol. 38, pp. 685-690.

[12] R. D. Jones, "Prediction of Teaching Efficiency from Objective Measures," Journal of Experimental Education, 1946, Vol. 15, pp. 85-99.

[13] H. L. Kriner, "Five-Year Study of Teachers College Admissions," Educational Administration and Supervision, 1937, Vol. 23, pp. 192-199.

for 19 "less successful" County Agents. Table 37 (page 195) shows the distribution of these TGPA's for the 74 County Agents, divided according to the differential success groups. The TGPA's ranged from .97 to 2.79, or from below a C average to slightly below a straight A average.

The two groups have been compared with respect to technical grade-point averages in Table 38 (page 196). The F-test was applied to these data to determine whether or not the observed difference in variances was significant. The F-value was not significant at the 5 per cent level, indicating that the two groups were homogeneous with respect to variance. Consequently, it was possible to apply the t-test, which assumes homogeneity of variance, in order to determine the significance of the difference in the two group means. The t-value was not significant at the 5 per cent level, indicating that the difference in the mean TGPA could be attributed to chance. Thus, the grades that the "more successful" County Agents received in their professional or technical courses in agriculture were not significantly different from those received by the "less successful" County Agents.

In general, these results are in keeping with the low correlations found in most studies of the relationship between professional grades and success in teaching. Jones[14] found a correlation coefficient of .26 between professional grades (grades in education

---

[14] Jones, op. cit., pp. 85–99.

TABLE 37

DISTRIBUTION OF THE TECHNICAL GRADE-POINT AVERAGES FOR COUNTY AGENTS, DIVIDED ACCORDING TO DIFFERENTIAL SUCCESS GROUPS

Intervals	Frequency		
	"More Successful"	"Less Successful"	Total
2.85 - 3.00	0	0	0
2.70 - 2.84	2	1	3
2.55 - 2.69	1	0	1
2.40 - 2.54	1	1	2
2.25 - 2.39	5	2	7
2.10 - 2.24	3	2	5
1.95 - 2.09	6	3	9
1.80 - 1.94	8	2	10
1.65 - 1.79	10	2	12
1.50 - 1.64	10	2	12
1.35 - 1.49	4	0	4
1.20 - 1.34	3	2	5
1.05 - 1.19	1	0	1
.90 - 1.04	1	2	3
Total	55	19	74

TABLE 38

COMPARISON OF THE "MORE SUCCESSFUL" AND "LESS SUCCESSFUL" COUNTY AGENTS WITH RESPECT TO TECHNICAL GRADE-POINT AVERAGE

Statistic	"More Successful"	"Less Successful"
N	55	19
$\bar{X}$	1.826	1.858
σ (a)	.3837	.4781
σ^2	.1472	.2286
	F = 1.55	
	t = .233	

(a) Unbiased estimate of population standard deviation and variance.

(Neither of the above tests of homogeneity is significant at the 5 per cent level).

courses) and pupil gain ratings of teachers and a coefficient of .20 between these professional grades and supervisory ratings. Seagoe[15] found a correlation coefficient of -.15 between grades in professional courses and rank on the high school staff. Sandiford and Others[16] reviewed 16 studies that attempted to predict success in teaching from grades in practice teaching and found correlations ranging from .06 to .70 with a median coefficient in the 16 studies of .23. While Kriner's[17] correlation coefficient of .402 between TGPA and supervisory ratings of teachers tends to indicate that a relationship might exist, in general, the attempts to predict success in teaching from TGPA have met with unsatisfactory results.

This lack of relationship between grades, both technical and all-college, and work effectiveness would indicate that other factors in the individual's personality may play a more important role in determining his success on the job of a County Agent than does his scholarship. In addition to other factors of personality, however, such contingency factors as the type of work situation, the social context, or the economic context in which the agent finds himself once he is out of college and has started his work as an extension agent might play an important part in determining his work effectiveness.

---

[15] Seagoe, op. cit., pp. 685-690.

[16] Peter Sandiford and Others, Forecasting Teaching Ability, University of Toronto Department of Education Research Bulletin, No. 8, 1937.

[17] Kriner, op. cit., pp. 192-199.

Comparison of the "more successful" and "less successful" County Agents with respect to the number of hours of technical agriculture taken in college. Data relevant to the number of hours of technical agriculture taken in college was obtained for the entire sample of 81 County Agents. However, included in the sample were seven agents who had taken no courses in technical agriculture. Table 39 (page 199) shows the distribution of these numbers of hours of technical agriculture for the County Agents, divided according to the differential success groups.

The 60 "more successful" and the 21 "less successful" County Agents are compared in Table 40 (page 200) with respect to the number of hours of technical agriculture that they took while enrolled in college. The latter group was found to have a higher mean, and greater variability. However, Snedecor's F-ratio showed that the difference in variability was not significant. The t-test, employed to determine the significance of the difference in means, indicated that the means were not significantly different. It was therefore assumed that the amount of college work in technical agriculture subjects was not significantly related to the work effectiveness of this group of extension agents.

Although the difference in the means of the two groups did not differ significantly, the mean for the group of "less successful" agents was higher than the mean for the group of "more successful" agents. In other words, what relationship did exist, was an inverse rather than a positive relationship. It would be worthwhile to study a larger group of agents to determine whether this relationship existed for agents in other states.

TABLE 39

DISTRIBUTION OF THE NUMBER OF HOURS OF TECHNICAL AGRICULTURE TAKEN BY COUNTY AGENTS, DIVIDED ACCORDING TO DIFFERENTIAL SUCCESS GROUPS

Intervals	Frequency		
	"More Successful"	"Less Successful"	Total
77 - 83	1	0	1
70 - 76	2	2	4
63 - 69	3	3	6
56 - 62	7	1	8
49 - 55	3	4	7
42 - 48	18	3	21
35 - 41	12	5	17
28 - 34	8	1	9
21 - 27	0	0	0
14 - 20	1	0	1
7 - 13	0	0	0
0 - 6	5	2	7
Total	60	21	81

TABLE 40

COMPARISON OF THE "MORE SUCCESSFUL" AND "LESS SUCCESSFUL" COUNTY AGENTS WITH RESPECT TO THE NUMBER OF HOURS OF TECHNICAL AGRICULTURE TAKEN DURING COLLEGE

Statistic	"More Successful"	"Less Successful"
N	60	21
$\bar{X}$	42.23	45.86
σ (a)	17.932	19.425
σ^2	321.57	377.33
	F = 1.17	
	t = .794	

(a) Unbiased estimate of population standard deviation and variance.

(Neither of the above tests of homogeneity is significant at the 5 per cent level).

Comparison of County Agents who majored in various fields of emphasis with respect to rated success. The primary purpose of this part of the research was to compare the success ratings of the County Agents who had majored in various fields of emphasis in college. Table 41 (page 202) shows the distribution of the "more successful" and "less successful" County Agents in the various fields of emphasis.

In the present analysis, the Chi-square test was used to test the hypothesis that there were no significant differences among the success ratings of the individuals in the various fields of emphasis. Because the total sample of County Agents was divided into groups of 60 "more successful" and 21 "less successful" agents, then, if area of emphasis was not significantly related to work effectiveness, the individuals in each area would be divided according to this same proportion. In other words, theoretically, 74.07 per cent of the County Agents who majored in each field of emphasis should be classified in the "more successful" group.

Chi-square is an index of the divergence of fact from hypothesis. In this analysis, it was applied to measure the divergence of the observed frequencies in each field of college emphasis from the set of theoretical frequencies based upon the proportion of the total sample who were classified in each success group. The larger the divergence of the observed frequencies from the theoretical frequencies, the greater would be the value of Chi-square.

Table 42 (page 203) shows the application of this Chi-square test to the data. The computed Chi-square was 1.0683, with four degrees of freedom. Referring to a Chi-square table, it was

TABLE 41

DISTRIBUTION OF THE "MORE SUCCESSFUL" AND "LESS SUCCESSFUL" COUNTY AGENTS ACCORDING TO THEIR FIELDS OF EMPHASIS IN COLLEGE

Field of Emphasis	Majors Included in Fields	Frequency		
		"More Successful"	"Less Successful"	Total
0	No College Work	3	2	5
1	Soils, Crops & Agronomy	15	5	20
2	Farm Management Agricultural Economics	4	4	8
3	Animal Husbandry Dairy, Dairy Husbandry Dairy Products Dairy Production Dairy Manufacturing Poultry Husbandry	25	5	30
4	Agricultural Engineering Farm Engineering	1	0	1
5	Horticulture Pomology Apiculture	8	3	11
6	Agricultural Education	2	1	3
8	Forestry	0	0	0
9	Non-agricultural	2	0	2
11	Agricultural Extension	0	1	1
	Total	60	21	81

TABLE 42

COMPARISON OF COUNTY AGENTS WHO MAJORED IN VARIOUS FIELDS OF EMPHASIS WITH RESPECT TO RATED SUCCESS

Field of Emphasis	Observed Frequency "More Successful"	Expected Frequency	$\frac{(f_o - f_e)^2}{f_e}$
X[a]	8	8.88	.0872
1	15	14.81	.0024
2	4	5.93	.6281
3	25	22.22	.3478
5	8	8.15	.0028
		Chi-square =	1.0683
		d. f. = 4	

(a) Group X contains fields 0, 4, 6, 9 and 11. These groups were combined because it is not advisable to apply Chi-square to groups whose expected frequency is less than five.

(Chi-square is not significant at the 5 per cent level).

discovered that Chi-square with four degrees of freedom exceeds the derived 1.0683 about 90 per cent of the time. This is an adequate basis for accepting the null hypothesis that there were no significant differences in the success ratings of the agents who had majored in the various fields of emphasis. It can therefore be assumed that field of emphasis in college was not significantly related to the work effectiveness of the County Agents included in this study.

It would be desirable to study a larger sample of agents in order to analyze specific college majors within the field of agriculture, with sufficient individuals in each college major group to warrant the application of statistical procedures.

A Study of the Relationship Between the Selected Academic Factors and the Rated Success of the 48 4-H Club Agents

This part of the study is concerned with determining the relationship between the five academic factors and the rated work effectiveness of the 4-H Club Agents presently employed in Michigan. It was not possible to obtain complete data for some of the 4-H Club Agents. As a result, the samples involved in the analyses of data vary for the different academic factors. When the number of agents for whom data was not available was large, an attempt was made to compare the group for whom data was available with the group without data in order to determine the advisability of interpreting the results as representative of the entire group of 4-H Club Agents.

The supervisory ratings described in Chapter V divided the sample of 48 4-H Club Agents into relatively equal "quartile" groups

with respect to work effectiveness. As it was pointed out earlier in this chapter, the Extension Administrators and the Research Committee members decided that research designed to differentiate the small group of unsatisfactory agents from the rest of the group would be of greatest value to the Extension Service. It was further decided that the lowest quarter of the 4-H Club Agents would most adequately represent that group who might be classified as unsatisfactory agents, or "less successful" agents. Thus, the plan of this part of the study has been designed to compare the top three-quarters of the group, or the 39 "more successful" 4-H Club Agents, with the bottom quarter, or the nine "less successful" 4-H Club Agents, with respect to the selected academic factors.

Comparison of the "more successful" and "less successful" 4-H Club Agents with respect to scores on the ACE. It was possible to obtain decile ranks on the American Council on Education Psychological Examination, the ACE, for 36 of the 48 4-H Club Agents. This sub-sample was studied first and then compared with the remainder of the group to determine the homogeneity of the two parts of the sample. These data were available for 30 "more successful" agents and six "less successful" agents. Table 43 (page 206) shows the distribution of these decile ranks on the ACE for the 36 4-H Club Agents, divided according to differential success groups. Examination of the data presented in this table reveals that the top four 4-H Club Agents on the ACE decile rankings were in the "more successful" group and that 15 of the top 17 were in the "more successful" group. It is also

TABLE 43

DISTRIBUTION OF THE DECILE RANKS ON THE ACE FOR THE 4-H CLUB AGENTS, DIVIDED ACCORDING TO THE DIFFERENTIAL SUCCESS GROUPS

Decile	Frequency		
	"More Successful"	"Less Successful"	Total
10	0	0	0
9	1	0	1
8	1	0	1
7	2	0	2
6	6	1	7
5	5	1	6
4	2	1	3
3	5	0	5
2	5	1	6
1	3	2	5
Total	30	6	36

worthy of note that no agents in the "less successful" group ranked above the sixth decile on the ACE.

Table 44 (page 208) shows the results of the comparison of the "more successful" and "less successful" 4-H Club Agents on the ACE. The derived "F" indicated that the two groups could be assumed to be from populations that were not different with respect to variance. Thus, the t-test was applied. It was found that in spite of the differences noted in the preceding paragraph, the two groups were not significantly different with respect to mean decile rank on the ACE. The two means reflect differences favoring the "more successful" group of agents, but with this size sample, the differences are too small to warrant concluding that they are significant. It would be worthwhile to investigate these differences more carefully with a larger sample using, if possible, the raw scores on the ACE rather than decile rank.

From the above evidence, it was possible to assume that in this group of 36 4-H Club Agents, academic aptitude within the range represented did not influence work effectiveness as measured by administrative ratings. It must be remembered, however, that the minimum academic aptitude represented in this group of agents was sufficient to allow all of them to be granted admission to college and to succeed well enough in college to graduate.

ACE scores were not available for 12 of the 4-H Club Agents. It was therefore necessary to compare this group of agents without ACE scores with the group for whom ACE scores were available in order to determine the advisability of interpreting the above results

TABLE 44

COMPARISON OF THE "MORE SUCCESSFUL" AND "LESS SUCCESSFUL" 4-H CLUB AGENTS WITH RESPECT TO ACE SCORES

Statistic	"More Successful"	"Less Successful"
N	30	6
$\bar{X}$(a)	46.17	42.33
σ(b)	6.686	7.448
σ^2	44.70	55.47
	F = 1.24	
	t = 1.26	

(a) The decile ranks were converted to T-scores.
(b) Unbiased estimates of the population variance and standard deviation.

(Neither of the above tests of homogeneity is significant at the 5 per cent level).

as representative of the entire group of 4-H Club Agents. These two groups were first compared with respect to age, tenure, all-college grade-point average, and technical grade-point average. The results of this analysis are presented in Table 45.

TABLE 45

COMPARISON OF MEANS AND VARIANCES OF THE AGE, TENURE, ALL-COLLEGE GRADE-POINT AVERAGE (GPA), AND TECHNICAL GRADE-POINT AVERAGE (TGPA), FOR THE GROUPS OF 4-H CLUB AGENTS WITH AND WITHOUT ACE SCORES

Variable	Without ACE Scores		With ACE Scores		Tests of Homogeneity	
	$\bar{X}$	σ^2	$\bar{X}$	σ^2	F	t or d (a)
Age	41.58	73.36	30.36	29.49	2.49*	4.26**
Tenure	8.17	30.33	2.86	5.27	5.76**	3.25**
GPA	1.58	.143	1.47	.108	1.32	.964
TGPA	1.80	.501	1.79	.138	3.63**	.008

(a) Behrens-Fisher d-test was used when the groups lacked homogeneity of variance, or F-test was significant.

* Significant at the 5 per cent level.
** Significant at the 1 per cent level.

In addition to comparing the two groups with respect to these four variables, they were also compared with respect to work effectiveness and job satisfaction. The Chi-square test was used to determine whether the group of agents for whom no ACE scores were available and the group of agents for whom scores were available were fundamentally homogeneous with respect to measured job satisfaction and rated work effectiveness. The results of this analysis are presented in Table 46.

TABLE 46

COMPARISON OF THE GROUPS OF 4-H CLUB AGENTS WITH AND WITHOUT ACE SCORES WITH RESPECT TO RATED WORK EFFECTIVENESS AND MEASURED JOB SATISFACTION

	With ACE Scores	Without ACE Scores	Chi-square
	N	N	
WORK EFFECTIVENESS			
More Successful	30	9	.4103
Less Successful	6	3	
Total	36	12	
JOB SATISFACTION			
More Satisfied	17	9	2.7979
Less Satisfied	19	3	
Total	36	12	

(Neither value of Chi-square is significant at the 5 per cent level).

The tests of homogeneity used in comparing these two groups of 4-H Club Agents revealed that the differences in age and tenure of the 4-H Club Agents with ACE scores and those without ACE scores were so great that they would be exceeded in less than 1 per cent of similar samples that were randomly sampled. The 4-H Club Agents for whom no scores were available were significantly older and had been on the job a significantly longer number of years than the other group. This result was expected because the major reason for not being able to obtain ACE scores for some of the agents was the fact that many of them had started college before academic aptitude tests were given and records kept in the colleges they attended. While this difference in age and tenure existed, there were no significant differences in the means of the two groups for all-college grade-point average or technical grade-point average, signifying that there was a high possibility that the two groups were not significantly different with respect to academic aptitude because they had not differed with respect to grades. This was further verified by the fact that the correlation coefficient found between ACE scores and GPA was .524 and this correlation coefficient is significant at the 1 per cent level or less. The two groups were also found to be homogeneous with respect to rated work effectiveness and measured job satisfaction, indicating that the agents for whom no ACE scores were available were similarly satisfied with their jobs and were equally effective in the performing of their work.

What do these results mean in terms of being able to interpret the results of the statistical analysis of the relationship between

ACE scores and rated work effectiveness as being representative of the results that might be expected were ACE scores available for all 48 of the 4-H Club Agents? The fact that the agents without ACE scores were older and had been employed by the Michigan Extension Service longer would not influence ACE scores necessarily. These agents went to school before aptitude tests were widely used by colleges but there is no reason to assume that they would have scored higher or lower than the group for whom scores were available. It does mean, however, that the group of 4-H Club Agents included in this analysis of the relationship between ACE scores and success are not representative of the entire group with respect to these two factors. In some ways, this might be considered an advantage for future selection and guidance purposes. Because the group studied was younger and had been employed a shorter period of time, they would be more like the group of college seniors and college graduates who are being considered for jobs as extension agents.

Because the groups did not differ significantly with respect to grades, and because of the correlation between grades and ACE scores, it is possible to conclude that as far as academic aptitude is concerned there is insufficient reason for rejecting the hypothesis that the agents for whom ACE scores were available are representative of the total group of 4-H Club Agents presently employed by the Michigan Extension Service.

This lack of a significant relationship between academic aptitude and success is in keeping with the results found for the group

of County Agents studied. Super concluded in 1949, after having reviewed innumerable researches, that, ". . . . given intelligence above the minimum for learning the occupation, be it executive work, teaching, packing or light assembly work, additional increments of intelligence appear to have no special effect on an individual's success in that occupation."[18] This conclusion seems to be born out in the present study of County Agents and 4-H Club Agents.

Comparison of the "more successful" and "less successful" 4-H Club Agents with respect to all-college grade-point average. All-college grade-point averages were available for all of the 48 4-H Club Agents. These 48 4-H Club Agents were classified according to differential success groups as follows: 39 "more successful" agents and nine "less successful" agents. The distribution of these GPA's for the 4-H Club Agents, divided according to differential success groups, is presented in Table 47 (page 214). The actual range on the GPA was from 1.00 to 2.44, indicating that a wide range of grades were received by the various agents in the sample. Examination of the distribution of GPA's revealed that no agents in the "less successful" group averaged higher than the interval of 1.65 to 1.79, while five of the "more successful" agents were above this level. The mean GPA was also slightly higher for the "more successful" group, being 1.523 as compared with 1.392 for the "less successful" group of agents.

---

[18] Donald E. Super, Appraising Vocational Fitness, New York: Harper and Brothers, 1949, p. 103.

TABLE 47

DISTRIBUTION OF THE ALL-COLLEGE GRADE-POINT AVERAGES FOR 4-H CLUB AGENTS, DIVIDED ACCORDING TO THE DIFFERENTIAL SUCCESS GROUPS

Intervals	Frequency		
	"More Successful"	"Less Successful"	Total
2.40 - 2.54	1	0	1
2.25 - 2.39	1	0	1
2.10 - 2.24	0	0	0
1.95 - 2.09	3	0	3
1.80 - 1.94	1	0	1
1.65 - 1.79	4	1	5
1.50 - 1.64	8	2	10
1.35 - 1.49	9	3	12
1.20 - 1.34	7	1	8
1.05 - 1.19	4	0	4
.90 - 1.04	1	2	3
Total	39	9	48

To test the significance of the above difference in means, the two groups were first tested for homogeneity of variance. The computed "F" was not significant at either the 5 per cent level or 1 per cent level, indicating that they were homogeneous. When the t-test was applied to test the difference in means, it was discovered that the difference in means was too small not to be attributable to chance variation in samples. The results of this analysis are presented in Table 48 (page 216).

Thus, in both the County Agent group and in the 4-H Club Agent group, grades were not significantly related to success on the job. As was pointed out earlier in the chapter, these results agree with the low correlations generally found between intelligence and success in teaching.

Comparison of the "more successful" and "less successful" 4-H Club Agents with respect to technical grade-point average. Technical grade-point averages were obtained for 43 of the 4-H Club Agents. These 43 agents were classified according to differential success groups as follows: 34 "more successful" agents and nine "less successful" agents. Table 49 (page 217) shows the distribution of the technical grade-point averages for these agents, divided according to differential success groups. In examining this distribution, certain facts are worthy of note. Only one of the nine agents classified as "less successful" received grades in his professional courses in agriculture that averaged above the class from 1.80 to 1.94. Of the 34 "more successful" agents, however, 16 individuals had grades

TABLE 48

COMPARISON OF THE "MORE SUCCESSFUL" AND "LESS SUCCESSFUL" 4-H CLUB AGENTS WITH RESPECT TO ALL-COLLEGE GRADE-POINT AVERAGE

Statistic	"More Successful"	"Less Successful"
N	39	9
$\bar{X}$	1.523	1.392
σ (a)	.3312	.2459
σ^2	.1097	.0605
	F = 1.81	
	t = 1.11	

(a) Unbiased estimates of the population variance and standard deviation.

(Neither of the above tests of homogeneity is significant at the 5 per cent level).

TABLE 49

DISTRIBUTION OF THE TECHNICAL GRADE-POINT AVERAGES FOR 4-H CLUB AGENTS, DIVIDED ACCORDING TO THE DIFFERENTIAL SUCCESS GROUPS

Intervals	Frequency		
	"More Successful"	"Less Successful"	Total
2.85 - 3.00	1	0	1
2.70 - 2.84	1	0	1
2.55 - 2.69	1	0	1
2.40 - 2.54	1	1	2
2.25 - 2.39	2	0	2
2.10 - 2.24	2	0	2
1.95 - 2.09	8	0	8
1.80 - 1.94	2	2	4
1.65 - 1.79	2	1	3
1.50 - 1.64	4	0	4
1.35 - 1.49	7	2	9
1.20 - 1.34	2	2	4
1.05 - 1.19	1	1	2
Total	34	9	43

that averaged above that level. In addition, a comparison of the means of the two groups revealed that the "more successful" group of 4-H Club Agents had a higher mean, 1.841, as compared with 1.616 for the "less successful" group.

Table 50 (page 219) shows the results of the comparison of the 34 "more successful" 4-H Club Agents and the nine "less successful" 4-H Club Agents with respect to technical grade-point averages. The groups were found to be homogeneous with respect to variance so the t-test was applied to test the significance of the observed difference in means. The computed "t" was not significant at either the 5 per cent level or the 1 per cent level, indicating that the observed difference in the means was not large enough to be significant. Thus, it was concluded that in this sample of extension agents, the type or quality of grades received in professional courses in agriculture was not significantly related to their work effectiveness as rated by the extension supervisors, although those men who averaged 1.95 and over tended to be rated as "more successful" agents.

Comparison of the "more successful" and "less successful" 4-H Club Agents with respect to the number of hours of technical agriculture taken in college. Data relevant to the number of hours of technical agriculture taken in college was obtained for the entire group of 4-H Club Agents. However, five of these agents had not taken any courses in technical agriculture and one agent had taken only a two-credit course. Table 51 (page 220) shows the distribution

TABLE 50

COMPARISON OF THE "MORE SUCCESSFUL" AND "LESS SUCCESSFUL" 4-H CLUB AGENTS WITH RESPECT TO TECHNICAL GRADE-POINT AVERAGE

Statistic	"More Successful"	"Less Successful"
N	34	9
$\bar{X}$	1.841	1.616
σ (a)	.4536	.4192
σ^2	.2058	.1757
	F = 1.17	
	t = 1.34	

(a) Unbiased estimates of the population variance and standard deviation.

(Neither of the above tests of homogeneity is significant at the 5 per cent level).

TABLE 51

DISTRIBUTION OF THE NUMBER OF HOURS OF TECHNICAL AGRICULTURE TAKEN BY 4-H CLUB AGENTS, DIVIDED ACCORDING TO DIFFERENTIAL SUCCESS GROUPS

Intervals	Frequency		
	"More Successful"	"Less Successful"	Total
77 - 83	1	0	1
70 - 76	0	0	0
63 - 69	2	0	2
56 - 62	4	1	5
49 - 55	1	0	1
42 - 48	10	5	15
35 - 41	6	0	6
28 - 34	4	1	5
21 - 27	2	1	3
14 - 20	1	0	1
7 - 13	2	1	3
0 - 6	6	0	6
Total	39	9	48

of the number of hours of technical agriculture for the 48 4-H Club Agents, divided according to differential success groups. Examination of the data in Table 51 (page 220) revealed that all six of the men who had less than two credit hours of technical agriculture were rated as "more successful" agents, indicating that courses in agriculture are not essential to rated success on the job. The actual range of hours was from 0 to 78. Both groups showed a high degree of variability for this variable.

Application of the tests of homogeneity are shown in Table 52 (page 222). The computed F-ratio indicated that the variability of these two groups were not significantly different and could be attributed to chance fluctuation from sample to sample. Application of the t-test indicated that there was not sufficient reason to reject the hypothesis that the two samples' means were not significantly different, or that the difference in means might well result from chance selection of samples from the population.

These results indicated that rated work effectiveness in this sample of 4-H Club Agents was not significantly related to the amount of college work that the individuals had finished in professional agriculture courses.

Comparison of 4-H Club Agents who majored in various fields of emphasis in college, with respect to rated success. The major purpose of this part of the research was to determine whether or not there were any significant differences in the success ratings of the 4-H Club Agents who had majored in various fields of emphasis in

TABLE 52

COMPARISON OF THE "MORE SUCCESSFUL" AND "LESS SUCCESSFUL" 4-H CLUB AGENTS WITH RESPECT TO THE NUMBER OF HOURS OF TECHNICAL AGRICULTURE TAKEN DURING COLLEGE

Statistic	"More Successful"	"Less Successful"
N	39	9
$\bar{X}$	35.26	38.66
$\sigma^{(a)}$	20.24	13.49
σ^2	409.67	182.00
	F = 2.25	
	t = .478	

(a) Unbiased estimate of population variance and standard deviation.

(Neither of the above tests of homogeneity is significant at the 5 per cent level).

college. Table 53 (page 224) shows the distribution of the "more successful" and "less successful" 4-H Club Agents according to their fields of emphasis.

Because the success rating was a dichotomous criterion, Chi-square was used to test the hypothesis that there were no significant differences among the success ratings of the agents who had majored in various fields of emphasis. Because the total sample of 4-H Club Agents was divided into groups of 39 "more successful" and nine "less successful" agents, then, if area of emphasis was not related to work effectiveness, the individuals in each area would be divided according to this same proportion. In other words, theoretically, 81.25 per cent of the 4-H Club Agents who majored in each field of emphasis would be classified in the "more successful" group.

In this part of the study, Chi-square was applied to measure the divergence of the observed frequencies in each field of emphasis who were classified "more successful" from the theoretical frequencies based on the proportion of the total sample classified in the "more successful" group. Table 54 (page 225) shows the results of the application of the Chi-square test to this data. The derived Chi-square was .1421. Referring to a Chi-square table, it was discovered that Chi-square with two degrees of freedom exceeds the derived .1421 from 90 to 95 per cent of the time in samples selected at random. Thus, it was possible to accept the hypothesis that there were no significant differences in the success ratings of the agents who had majored in the various fields of emphasis.

It would be desirable to study a large enough sample so that it

TABLE 53

DISTRIBUTION OF THE "MORE SUCCESSFUL" AND "LESS SUCCESSFUL" 4-H CLUB AGENTS ACCORDING TO THEIR FIELDS OF EMPHASIS IN COLLEGE

Field of Emphasis	Majors Included in Fields	Frequency		
		"More Successful"	"Less Successful"	Total
0	No College Work	0	0	0
1	Soils, Crops & Agronomy	4	0	4
2	Farm Management Agricultural Economics	1	0	1
3	Animal Husbandry Dairy, Dairy Husbandry Dairy Products Dairy Production Dairy Manufacturing Poultry Husbandry	13	4	17
4	Agricultural Engineering Farm Engineering	2	1	3
5	Horticulture Pomology Apiculture	1	1	2
6	Agricultural Education	3	1	4
8	Forestry	2	0	2
9	Non-agricultural	9	1	10
11	Agricultural Extension	4	1	5
	Total	39	9	48

TABLE 54

COMPARISON OF 4-H CLUB AGENTS WHO MAJORED IN VARIOUS FIELDS OF EMPHASIS WITH RESPECT TO RATED SUCCESS

Field of Emphasis	Observed Frequency "More Successful"	Expected Frequency	$\frac{(f_o - f_e)^2}{f_e}$
3	13	13.812	.0477
9	9	8.125	.0942
X(a)	17	17.062	.0002
		Chi-square =	.1421
		d. f. = 2	

(a) Group X contains fields 0, 1, 2, 4, 5, 6, 8, 10 and 11. These groups were combined because it is not advisable to apply Chi-square to groups whose expected frequency is less than five.

(Chi-square is not significant at the 5 per cent level).

would be possible to consider each group of majors separately, or, ideally, large enough to study each major separately. However, the present sample is large enough to warrant the conclusion that field of emphasis was not significantly related to the work effectiveness ratings of the 4-H Club Agents presently employed in the state of Michigan.

Summary of Chapter VII

The primary purpose of this chapter has been to determine the relationship between selected academic factors and the rated success of the 81 County Agents and 48 4-H Club Agents presently employed by the Michigan Extension Service. The selected academic factors considered in this study are: ACE decile scores, all-college grade-point averages, technical agriculture grade-point averages, number of hours taken in technical agriculture courses, and college major or field of emphasis. For the purpose of this study, the County Agents and the 4-H Club Agents were considered as separate samples.

In order to study the relationship between these academic factors and work effectiveness, the 81 County Agents were divided into groups of 60 "more successful" and 21 "less successful" agents, upon the basis of the quartile rankings given by the seven extension supervisors. The top three-quarters of the County Agents on the success ratings were classified as "more successful" and the bottom quarter were classified as "less successful."

It was found that for the 26 County Agents for whom ACE scores were available that there was no significant difference between the

"more successful" and the "less successful" groups with respect to mean ACE decile rank. Because it was possible to obtain ACE scores for only 26 of the 81 County Agents, the two groups, those with ACE scores and those without such scores, were compared on the basis of age, tenure, all-college grade-point average, technical grade-point average, rated success, and measured job satisfaction. This study was undertaken to determine the advisability of interpreting the above results as being representative of the total sample. It was found that it would be inadvisable to consider these 26 agents as representative of the total group of 81 County Agents until further observations had been made relative to the academic aptitude of the entire group of County Agents employed in Michigan.

It was found that there were no significant differences between the differential success groups of County Agents with regard to mean all-college grade-point average.

Further study revealed that there were no significant differences in these differential success groups with respect to technical grade-point average or number of hours of technical agriculture taken in college.

Studying the data available on the County Agents who majored in various fields of emphasis in college revealed that there were no significant differences in the success ratings of the individuals in the various fields.

The 4-H Club Agents were divided into groups of 39 "more successful" and nine "less successful" agents, by the same procedure

described above for the County Agents. These two groups were then compared with respect to the independent variables.

ACE scores were available for 36 of the 48 4-H Club Agents. Examination of the distribution of these agents over the 10 deciles revealed that the top four 4-H Club Agents on the ACE decile rankings were in the "more successful" group and that 15 of the top 17 were in the "more successful" group. It was also observed that no agents in the "less successful" group ranked above the sixth decile. Application of the appropriate test of significance revealed that there was no significant difference between the "more successful" and "less successful" groups with respect to mean ACE decile rank, in spite of the above observed trends.

Because ACE scores were available for only 36 of the 48 4-H Club Agents, the two groups, those with ACE scores and those without ACE scores, were compared with respect to age, tenure, all-college grade-point average, technical grade-point average, number of hours of technical agriculture, rated success and measured job satisfaction. This study was made to determine the advisability of interpreting the above results as being representative of the results that would be found were ACE scores available for the entire sample. It was found that the two groups were not homogeneous with respect to age and tenure, with the group for whom no ACE scores were available being the older group and the group who had been on this job longer. However, the two groups were homogeneous with respect to all-college grade-point averages, technical grade-point averages, work effectiveness and job satisfaction. This information, combined with the

relatively high correlation coefficient found between ACE scores and all-college grade-point averages led to the conclusion that the two groups were probably not significantly different with respect to academic aptitude. Thus, the results could be interpreted as being representative of the entire group of 4-H Club Agents.

It was also found that there were no significant differences between the "more successful" and "less successful" agents with respect to mean GPA. However, again examination of the frequency distribution revealed a trend worthy of note. No agents in the "less successful" group of 4-H Club Agents averaged higher than the interval of 1.65 to 1.79, while five of the "more successful" group were above this level.

Examination of the distribution of technical grade-point averages revealed that only one of the nine "less successful" agents averaged above the interval from 1.80 to 1.94, while 16 of the 34 "more successful" agents averaged above that level. Despite this trend, there was found to be no significant difference between the mean technical grade-point averages of these differential success groups.

In studying the number of hours of technical agriculture taken by these agents, it was noted that all six of the agents who had taken two credit hours or less of technical agriculture had been rated as "more successful" agents. Application of the t-test indicated that there was no significant difference between the mean number of hours of technical agriculture taken by the men in the variable success groups.

Comparing the 4-H Club Agents who majored in various fields of

emphasis in college with respect to rated success revealed that there were no significant differences among the various fields.

CHAPTER VIII

ANALYSIS OF THE DATA RELATING THE SELECTED ACADEMIC FACTORS TO MEASURED JOB SATISFACTION

The present chapter is concerned with the area of measured job satisfaction and the relationship between this criterion measure and five independent variables: (1) scores on the American Council on Education Psychological Examination, (2) all-college grade-point averages, (3) technical grade-point averages, (4) number of hours taken in technical agriculture, and (5) college majors or fields of emphasis in college. The chapter is divided into two parts. Part I deals with the data on the County Agents and Part II concerns the data on the 4-H Club Agents.

A Study of the Relationship Between the Selected Academic Factors and the Measured Job Satisfaction of the 81 County Agents

The principal concern of this part of the study was to determine the relationship between the five selected academic factors and the measured job satisfaction of the 81 County Agents included in the sample.

The total group of County Agents was divided into variable satisfaction groups on the basis of their scaled scores on the Job Satisfaction Questionnaire described in Chapter V. Because few, if any, of the County Agents expressed dissatisfaction with their jobs, the agents could not be classified as satisfied and dissatisfied agents.

As a result, they were divided into approximately equal groups of "more satisfied" and "less satisfied" agents. Separating the total group between the scaled satisfaction scores of three and four resulted in one group of 44 "more satisfied" County Agents and a second group of 37 "less satisfied" County Agents. These groupings were used for all of the comparisons in this part of the study, for the purpose of comparing these variable satisfaction groups with respect to the selected academic factors.

Comparison of the "more satisfied" and "less satisfied" County Agents with respect to scores on the ACE. The 26 County Agents for whom ACE scores were available were distributed between the variable satisfaction groups in the following proportions: 10 "more satisfied" agents and 16 "less satisfied" agents. This group of 26 agents was studied first and then compared with the other 55 County Agents to determine the advisability of interpreting the results as representative of the entire sample of County Agents. Table 55 (page 233) shows the distribution of these 26 ACE scores for the County Agents, divided according to the differential satisfaction groups. Examination of the data in this table reveals that the individuals in both groups are fairly evenly distributed over the range of deciles from one to nine.

The results of the comparison of the 10 "more satisfied" and the 16 "less satisfied" County Agents with respect to their ACE scores is shown in Table 56 (page 234). Application of the F-ratio indicated that any difference in the variances of the two groups could be

TABLE 55

DISTRIBUTION OF THE DECILE RANKS ON THE ACE FOR COUNTY AGENTS, DIVIDED ACCORDING TO THE DIFFERENTIAL SATISFACTION GROUPS

Decile	Frequency		
	"More Satisfied"	"Less Satisfied"	Total
10	0	0	0
9	0	1	1
8	1	2	3
7	1	3	4
6	0	1	1
5	2	3	5
4	2	2	4
3	1	1	2
2	2	0	2
1	1	3	4
Total	10	16	26

TABLE 56

COMPARISON OF THE "MORE SATISFIED" AND "LESS SATISFIED" COUNTY AGENTS WITH RESPECT TO ACE SCORES

Statistic	"More Satisfied"	"Less Satisfied"
N	10	16
$\bar{X}$(a)	45.80	48.19
σ(b)	6.893	8.352
σ^2	47.51	69.76
	F = 1.47	
	t = .757	

(a) The decile ranks on the ACE were converted to T-scores.
(b) The unbiased estimates of population variance and standard deviation are used.

(Neither of the above tests of homogeneity is significant at the 5 per cent level).

attributed to chance variation. The subsequent application of the t-test to the means of the two groups indicated that the two groups were not significantly different with respect to mean ACE decile rank. From this evidence it was possible to assume that academic aptitude within the range represented in this sample of 26 County Agents was not significantly related to job satisfaction as measured by the Job Satisfaction Questionnaire. These results agree with the results found by Quayle[1] on a group of stenographers, by Kornhauser and Sharp[2] for girl employees of a paper mill, by Clark[3] for teachers of vocational agriculture, and by Brayfield[4] for stenographers, general clerical workers, typists, low level machine clerical workers, and entry clerical workers. However, other investigators[5] found significant relationships

---

[1] M. S. Quayle, "A Study of Some Aspects of Satisfaction in the Vocation of Stenography," Teachers College, Columbia University Contributions to Education, No. 659, New York: Bureau of Publications, Teachers College, Columbia University, 1935.

[2] A. W. Kornhauser and A. A. Sharp, "Employee Attitudes: Suggestions from a Study in a Factory," Personnel Journal, 1932, Vol. 10, pp. 393-404.

[3] Raymond M. Clark, "Factors Associated With Decisions of Michigan Teachers to Remain in or to Leave the Field of Teaching Vocational Agriculture," (Unpublished Ed.D. thesis, Michigan State College, East Lansing, Michigan, 1950).

[4] A. H. Brayfield, "The Interrelationship of Measures of Ability, Aptitude, Interests and Job Satisfaction among Clerical Employees," (Unpublished Ph.D. thesis, University of Minnesota, Minneapolis, 1946).

[5] Ibid., and:
V. V. Anderson, Psychiatry in Industry, New York: Harper and Brothers, 1929, pp. 88-89.
W. D. Scott, R. C. Clothier, S. B. Mathewson, and W. R. Spriegel, Personnel Management, New York: McGraw-Hill, 1941, p. 464.
R. Taft and A. Mullins, "Who Quits and Why," Personnel Journal, 1946, Vol. 24, No. 8, pp. 300-307.
S. M. Wesley, "A Quantitative Study of Job Satisfaction in a Sample of Former University of Minnesota Students," (Unpublished M.S. thesis, University of Minnesota, Minneapolis, 1939).

between general ability or intelligence and job satisfaction or work attitudes.

Because ACE scores were not available for 55 of the 81 County Agents, the two groups, those with ACE scores and those without ACE scores, were compared with respect to age, tenure, all-college grade-point average, technical grade-point average, work effectiveness, and job satisfaction. The results of this analysis were presented in Chapter VII. As was pointed out in this previous chapter, the agents for whom no scores were available were significantly older and had been on the job a significantly longer period of time than the group of agents for whom scores were available. Although this difference was to be expected, because the major reason for not being able to obtain ACE scores on agents was the fact that many of them had attended college before Michigan State College began its test record file, this difference in age and tenure means that the 26 agents studied are not representative of the total group of County Agents with respect to these two variables. The fact that the sample studied is younger and have been on the job less time will be advantageous, however, for future selection and guidance purposes. This younger group will be more like the young men who are applying for work as extension agents.

The two groups were homogeneous with respect to technical grade-point averages and rated work effectiveness. However, the differences that existed between these two groups with respect to all-college grade-point averages and measured job satisfaction were large enough to cast doubt upon the homogeneity of the groups. It was thus deemed inadvisable to consider this group of 26 agents representative of the

entire sample of County Agents until further observations had been made.

Comparison of the "more satisfied" and "less satisfied" County Agents with respect to all-college grade-point average. All-college grade-point averages were available for the 78 County Agents who had attended college. These 78 agents were classified according to satisfaction as follows: 43 "more satisfied" agents and 35 "less satisfied" agents. Table 57 (page 238) shows the distribution of these GPA's for the County Agents, divided according to differential satisfaction groups. The range of grade-point averages was from .76 to 2.53, indicating that a wide range of scholarship was represented by this group of individuals. Examination of these data shows that both groups were fairly evenly distributed over the range of averages.

Table 58 (page 239) shows the results of the comparison of the differential satisfaction groups with respect to all-college grade-point average. Application of Snedecor's F-ratio indicated that the difference in variance of the two groups could be attributed to chance variation. The calculated "t" was not significant at either the 5 per cent level or the 1 per cent level, indicating that grades are not necessarily good indicators of whether or not County Agents will be satisfied with their jobs in the field of extension work.

This lack of relationship between all-college grade-point average and job satisfaction is consistent with the results found by Clark[6] for teachers of vocational agriculture in Michigan.

---

[6] Clark, op. cit.

TABLE 57

DISTRIBUTION OF THE ALL-COLLEGE GRADE-POINT AVERAGES FOR COUNTY AGENTS, DIVIDED ACCORDING TO THE DIFFERENTIAL SATISFACTION GROUPS

Intervals	Frequency		
	"More Satisfied"	"Less Satisfied"	Total
2.40 - 2.54	2	1	3
2.25 - 2.39	0	0	0
2.10 - 2.24	0	3	3
1.95 - 2.09	1	2	3
1.80 - 1.94	3	3	6
1.65 - 1.79	3	6	9
1.50 - 1.64	9	4	13
1.35 - 1.49	7	7	14
1.20 - 1.34	7	7	14
1.05 - 1.19	5	1	6
.90 - 1.04	6	0	6
.75 - .89	0	1	1
Total	43	35	78

TABLE 58

COMPARISON OF THE "MORE SATISFIED" AND "LESS SATISFIED" COUNTY AGENTS WITH RESPECT TO ALL-COLLEGE GRADE-POINT AVERAGE

Statistic	"More Satisfied"	"Less Satisfied"
N	43	35
$\bar{X}$	1.449	1.589
σ(a)	.3497	.3545
σ^2	.1223	.1257
	F = 1.03	
	t = 1.74	

(a) Unbiased estimates of the population standard deviation and variance are used.

(Neither of the above tests of homogeneity is significant at the 5 per cent level).

Comparison of the "more satisfied" and "less satisfied" County Agents with respect to technical grade-point average. Table 59 (page 241) presents the distribution of the technical grade-point averages for the 41 "more satisfied" and the 33 "less satisfied" County Agents for whom this information was available. These TGPA's ranged from .97 to 2.79, or from below a C average to slightly below a straight A average. Inspection of these data reveals that only one "less satisfied" agent averaged below 1.35, while eight of the "more satisfied" agents averaged below this level.

A comparison of these two groups on this variable is presented in Table 60 (page 242). The differences in variances of the two groups were small enough to be attributed to chance. The test of the significance of the difference between the two means shows that the difference was not significant, indicating that the grades received by students in their courses in technical agriculture were not good predictors of job satisfaction in this sample of County Agents. These results agree with the findings about the relationship between all-college grade-point averages and job satisfaction.

It must therefore be concluded that selection and counseling procedures based upon grades in college are in need of further examination, for seemingly they show no significant relationship to either work effectiveness or job satisfaction in the work of a County Agent in Michigan. These results are consistent with the results found by Clark[7] in his study of Michigan teachers of vocational agriculture. He found no significant relationship between TGPA and turnover.

---

[7] Ibid.

TABLE 59

DISTRIBUTION OF THE TECHNICAL GRADE-POINT AVERAGES FOR COUNTY AGENTS, DIVIDED ACCORDING TO DIFFERENTIAL SATISFACTION GROUPS

Intervals	Frequency		
	"More Satisfied"	"Less Satisfied"	Total
2.70 - 2.84	1	2	3
2.55 - 2.69	1	0	1
2.40 - 2.54	1	1	2
2.25 - 2.39	3	4	7
2.10 - 2.24	4	1	5
1.95 - 2.09	6	3	9
1.80 - 1.94	3	7	10
1.65 - 1.79	6	6	12
1.50 - 1.64	6	6	12
1.35 - 1.49	2	2	4
1.20 - 1.34	5	0	5
1.05 - 1.19	1	0	1
.90 - 1.04	2	1	3
Total	41	33	74

TABLE 60

COMPARISON OF THE "MORE SATISFIED" AND "LESS SATISFIED" COUNTY AGENTS WITH RESPECT TO TECHNICAL GRADE-POINT AVERAGE

Statistic	"More Satisfied"	"Less Satisfied"
N	41	33
$\bar{X}$	1.794	1.88
σ (a)	.4234	.3857
σ^2	.1793	.1487
	F = 1.21	
	t = .956	

(a) Unbiased estimate of the population standard deviation and variance is used.

(Neither of the above tests of homogeneity is significant at the 5 per cent level).

Comparison of the "more satisfied" and "less satisfied" County Agents with respect to the number of hours of technical agriculture taken in college. The distribution of the number of hours of technical agriculture taken by the 44 "more satisfied" and the 37 "less satisfied" County Agents is presented in Table 61 (page 244). Included in this sample were three "more satisfied" agents and four "less satisfied" agents who had taken no courses in technical agriculture.

A comparison of the variable satisfaction groups is presented in Table 62 (page 245). Snedecor's F-ratio showed the variances to be homogeneous. The "more satisfied" group of agents showed a higher mean, but the application of the t-test indicated that the difference in means was so small that it could be attributed to chance. Thus, it was concluded that the amount of work that a student took in agriculture was not significantly related to job satisfaction among the County Agents.

Educators are prone to hypothesize, at times, that a person who is better prepared for a job will be better satisfied with the job as a result of his increased preparation. The findings in this analysis would lead one to suspect that such an hypothesis will bear further investigation to determine whether or not it is based upon sufficient evidence.

TABLE 61

DISTRIBUTION OF THE NUMBER OF HOURS OF TECHNICAL AGRICULTURE TAKEN BY COUNTY AGENTS, DIVIDED ACCORDING TO DIFFERENTIAL SATISFACTION GROUPS

Intervals	Frequency		
	"More Satisfied"	"Less Satisfied"	Total
77 - 83	1	0	1
70 - 76	2	2	4
63 - 69	5	1	6
56 - 62	5	3	8
49 - 55	3	4	7
42 - 48	13	8	21
35 - 41	8	9	17
28 - 34	3	6	9
21 - 27	0	0	0
14 - 20	1	0	1
7 - 13	0	0	0
0 - 6	3	4	7
Total	44	37	81

TABLE 62

COMPARISON OF THE "MORE SATISFIED" AND "LESS SATISFIED" COUNTY AGENTS WITH RESPECT TO THE NUMBER OF HOURS OF TECHNICAL AGRICULTURE TAKEN DURING COLLEGE

Statistic	"More Satisfied"	"Less Satisfied"
N	44	37
$\bar{X}$	45.80	40.05
σ (a)	18.238	18.072
σ^2	332.63	326.61
	F = 1.01	
	t = 1.44	

(a) Unbiased estimate of population variance and standard deviation are used.

(Neither of the above tests of homogeneity is significant at the 5 per cent level).

Comparison of County Agents who majored in various fields of emphasis with respect to measured job satisfaction. This part of the investigation involved a comparison of the job satisfaction scores of the County Agents who majored in various fields of emphasis in college. Table 63 (page 248) presents the distribution of the "more satisfied" and "less satisfied" County Agents in the various fields of emphasis.

The scaled job satisfaction scores derived for each agent in Chapter V were used in this part of the study. To study the relationship between field of emphasis and job satisfaction, the statistical technique of analysis of variance was employed. However, before analysis of variance could be used on these data, it was necessary to test the groups for homogeneity of variance. Fields 4, 8, and 11 were excluded because they had less than two individuals in them. The remaining seven groups were tested for homogeneity of variance by Bartlett's M-test.[8] However, because the samples were small within each field of emphasis, Bartlett's

---

[8] The formula for Bartlett's M-test is:

$$-2 \log_e \mathcal{M} = N \log_e \left[\sum_{t=1}^{k} \frac{(v_t s_t^2)}{N} \right] - \sum_{t=1}^{k} (v_t \log_e s_t^2)$$

s_t^2 is unbiased estimate of population variance based on a sum of squares having v_t degrees of freedom and there are k independent estimates. Natural logarithms to the base e are used; taken from: P. O. Johnson, Statistical Methods in Research, New York: Prentice-Hall, Inc., 1949, pp. 83-86.

corrective factor, C,[9] was employed to correct the M-test results.

Bartlett indicates that the quantity $\frac{-2 \log_e \rho}{C}$ follows approximately the same distribution as Chi-square.[10] Applying the M-test with the above correction factor to the data on scale scores for the County Agents in the various fields of emphasis, the Chi-square approximation of 4.29586 was derived. Entering the Chi-square table with k-1 or 6 degrees of freedom, it was noted that the statistic was not significant at the 5 or the 1 per cent levels. It was thus accepted that there were no significant differences in variability of job satisfaction scores among these seven groups. This met the basic assumption of homogeneity of variance necessary for using analysis of variance.

Table 64 (page 249) shows the results of the application of analysis of variance to these data. The derived F-value was not significant at the 5 per cent level indicating that there were no significant differences in the various fields of emphasis with respect to job satisfaction scores.

It was therefore concluded that field of emphasis in college was not significantly related to the job satisfaction of the County Agents included in this study.

---

[9] Bartlett's Corrective formula, C, taken from: Ibid., p. 84, is:

$$C = 1 + \frac{1}{3(k-1)} \left\{ \sum_t \frac{1}{v_t} - \frac{1}{N} \right\}$$

[10] Johnson, op. cit., p. 84.

TABLE 63

DISTRIBUTION OF THE "MORE SATISFIED" AND "LESS SATISFIED" COUNTY AGENTS ACCORDING TO THEIR FIELDS OF EMPHASIS IN COLLEGE

Field of Emphasis	Majors Included in Fields	Frequency		
		"More Satisfied"	"Less Satisfied"	Total
0	No College Work	2	3	5
1	Soils, Crops & Agronomy	13	7	20
2	Farm Management Agricultural Economics	4	4	8
3	Animal Husbandry Dairy, Dairy Husbandry Dairy Products Dairy Production Dairy Manufacturing Poultry Husbandry	18	12	30
4	Agricultural Engineering Farm Engineering	0	1	1
5	Horticulture Pomology Apiculture	6	5	11
6	Agricultural Education	0	3	3
8	Forestry	0	0	0
9	Non-agricultural	1	1	2
11	Agricultural Extension	0	1	1
	Total	44	37	81

TABLE 64

ANALYSIS OF VARIANCE OF THE JOB SATISFACTION SCORES OF COUNTY AGENTS WHO MAJORED IN VARIOUS FIELDS OF EMPHASIS IN COLLEGE

Source of Variation	Degrees of Freedom	Sum of Squares	Estimated Population Variance	F
Between Groups	6	71.662	11.9436	
Within Groups	72	393.539	5.4658	2.1851*
Total	78	465.201		

* 10 P 5

A Study of the Relationship Between the Selected Academic Factors and the Measured Job Satisfaction of the 48 4-H Club Agents

This part of the investigation is concerned with determining the relationship between the measured job satisfaction of the 4-H Club Agents included in this study and the selected academic factors.

The 4-H Club Agents were divided into variable satisfaction groups on the basis of their raw scores on the Job Satisfaction Questionnaire. The raw scores were used for the 4-H Club Agents because, as was pointed out in Chapter V, it was found that the attitude being measured was not unidimensional. As a result of the multidimensional nature of the attitude, the scores on the Questionnaire were not scalable. Because few, if any, of the 4-H Club Agents expressed dissatisfaction with their jobs, the agents could not justifiably be classified as satisfied or dissatisfied agents. As a result, the agents were divided into relatively equal groups of "more satisfied" and "less satisfied" agents. By dividing the total group of 4-H Club Agents between the raw scores of 22 and 23 on the Questionnaire, the following groups resulted: 26 "more satisfied" agents and 22 "less satisfied" agents. These groupings were used as the basis for all of the comparisons in this part of the study.

Comparison of the "more satisfied" and "less satisfied" 4-H Club Agents with respect to scores on the ACE. It was possible to obtain ACE scores for 36 of the 48 4-H Club Agents. Table 65 (page 252) shows the distribution of these decile ranks for the 17 "more

satisfied" and the 19 "less satisfied" agents. Examination of these data shows that there were no individuals who scored above the sixth decile on the ACE in the "more satisfied" group of agents, while the four men who scored above that level were all classified as "less satisfied" agents. In addition to these facts, seven of the ten men who ranked in the first and second deciles on the ACE were in the "more satisfied" group of agents. These findings indicate a trend toward dissatisfaction on the part of the agents with higher academic ability or aptitude.

Table 66 (page 253) presents the results of the analysis of the difference in means. To normalize the data for statistical analysis, the decile ratings were converted to T-scores. The mean of these T-scores for the "more satisfied" group was 43.35 and for the "less satisfied" it was 47.47. The higher mean in the "less satisfied" group re-emphasized the possible trend found in the preceding paragraph. To test whether or not this difference in means was significant, the appropriate F-ratio and t-test were employed. The derived "F" value was not significant, indicating homogeneity of variance. The calculated "t" value was not significant, indicating that the difference in means was not large enough to be significant.

As a result of this analysis, it must be concluded that although agents who rank above the sixth decile on the ACE tended to be less satisfied with their jobs and those who scored below the third decile on the ACE tended to be more satisfied with their jobs, the difference in mean decile rank between the "more satisfied" and "less

TABLE 65

DISTRIBUTION OF THE DECILE RANKS ON THE ACE FOR THE 4-H CLUB AGENTS, DIVIDED ACCORDING TO THE DIFFERENTIAL SATISFACTION GROUPS

Decile	Frequency		
	"More Satisfied"	"Less Satisfied"	Total
10	0	0	0
9	0	1	1
8	0	1	1
7	0	2	2
6	3	4	7
5	2	4	6
4	1	2	3
3	4	2	6
2	5	0	5
1	2	3	5
Total	17	19	36

TABLE 66

COMPARISON OF THE "MORE SATISFIED" AND "LESS SATISFIED" 4-H CLUB AGENTS WITH RESPECT TO ACE SCORES

Statistic	"More Satisfied"	"Less Satisfied"
N	17	19
$\bar{X}$(a)	43.35	47.47
σ(b)	5.465	7.516
σ^2	29.87	56.49
	F = 1.89	
	t = 1.86	

(a) The decile ranks on the ACE were converted to T-scores.
(b) Unbiased estimates of the population variance and standard deviation.

(Neither of the above tests of homogeneity is significant at the 5 per cent level).

satisfied" 4-H Club Agents was not significant. It would be worthwhile to investigate this relationship in greater detail with a larger sample of agents, perhaps including agents from other states and agents who are employed by the Extension Service in future years.

Because ACE scores were not available for 12 of the 4-H Club Agents, these two groups, those with ACE scores and those without ACE scores, were compared with respect to age, tenure, all-college grade-point average, technical grade-point average, work effectiveness and job satisfaction. The results of this analysis were presented in Chapter VII. As was pointed out in this earlier chapter, the agents for whom no scores were available were significantly older and had been on the job a significantly longer period of time than the group of agents for whom scores were available. This fact actually enhances the use of these results for selection and guidance purposes, because the group is thus much more like the group of young men who will be applying to the Extension Service for jobs and asking for counseling.

The two groups were found to be homogeneous with respect to the other four variables: GPA, TGPA, work effectiveness, and job satisfaction. As was pointed out in Chapter V, the fact that the two groups were homogeneous with respect to GPA and TGPA, and because of the fact that there was fairly high correlation between ACE scores and the GPA, there is insufficient reason to believe that the agents for whom no ACE scores were available were different from the agents for whom ACE scores were available with respect to academic aptitude.

In addition, the fact that the groups were homogeneous with respect to work effectiveness and job satisfaction eliminates any possible bias that might be introduced in this area.

It must therefore be concluded that academic aptitude as measured by the ACE is not significantly related to job satisfaction in this group of 4-H Club Agents.

Comparison of the "more satisfied" and "less satisfied" 4-H Club Agents with respect to all-college grade-point average. All-college grade-point averages were available for all of the 4-H Club Agents. The distribution of these GPA's for the 26 "more satisfied" and 22 "less satisfied" agents is presented in Table 67 (page 256). Examination of these data reveal that both groups are fairly normally distributed over the entire range of averages.

Table 68 (page 257) gives the results of the comparison of these variable satisfaction groups with respect to GPA. The variances were found to be homogeneous and the derived "t" indicated that the difference in means could be the result of chance variation in a random sampling of the entire population. Finding that the means were not significantly different indicates that the type of grades these men received when they were in college was not significantly related to job satisfaction in this group of 4-H Club Agents.

Comparison of the "more satisfied" and "less satisfied" 4-H Club Agents with respect to technical grade-point average. Technical grade-point averages were obtained for the 43 4-H Club Agents who had taken courses in agriculture at the Junior and Senior level in

TABLE 67

DISTRIBUTION OF THE ALL-COLLEGE GRADE-POINT AVERAGES FOR 4-H CLUB AGENTS, DIVIDED ACCORDING TO THE DIFFERENTIAL SATISFACTION GROUPS

Intervals	Frequency		
	"More Satisfied"	"Less Satisfied"	Total
2.40 - 2.54	1	0	1
2.25 - 2.39	0	1	1
2.10 - 2.24	0	0	0
1.95 - 2.09	2	1	3
1.80 - 1.94	1	0	1
1.65 - 1.79	4	1	5
1.50 - 1.64	6	4	10
1.35 - 1.49	5	7	12
1.20 - 1.34	3	5	8
1.05 - 1.19	1	3	4
.90 - 1.04	3	0	3
Total	26	22	48

TABLE 68

COMPARISON OF THE "MORE SATISFIED" AND "LESS SATISFIED" 4-H CLUB AGENTS WITH RESPECT TO ALL-COLLEGE GRADE-POINT AVERAGE

Statistic	"More Satisfied"	"Less Satisfied"
N	26	22
$\bar{X}$	1.535	1.455
σ (a)	.3406	.2927
σ^2	.1160	.0857
	F = 1.35	
	t = .865	

(a) Unbiased estimates of the population variance and standard deviation.

(Neither of the above tests of homogeneity is significant at the 5 per cent level).

college. These 43 agents were classified according to differential satisfaction groups as follows: 23 "more satisfied" and 20 "less satisfied." The distribution of the TGPA's for these two groups of agents is presented in Table 69 (page 259). Inspection of this distribution reveals that seven of the nine men who had TGPA's above 2.09 were classified as "more satisfied" agents.

The results of the comparison of the variable satisfaction groups with respect to TGPA are presented in Table 70 (page 260). These results show that the two groups are homogeneous with respect to variance and any difference in means can be attributed to chance error in sampling. Thus, although the men who scored above 2.09 on TGPA tended to be classified as "more satisfied" agents, the type of grades that these agents received in college was not significantly related to their job satisfaction as a group.

Comparison of the "more satisfied" and "less satisfied" 4-H Club Agents with respect to the number of hours of technical agriculture taken in college. Data relevant to the number of hours of technical agriculture taken by these agents was obtained for the entire group of agents. However, five of these agents had not taken any courses in technical agriculture and one had taken only a two-credit course. Table 71 (page 262) shows the distribution of the number of technical agriculture hours for the 48 4-H Club Agents, divided according to differential satisfaction groups. Examination of these data reveals that four of the six men who had taken less than two credit hours in technical agriculture were classified as

TABLE 69

DISTRIBUTION OF THE TECHNICAL GRADE-POINT AVERAGES FOR 4-H CLUB AGENTS, DIVIDED ACCORDING TO THE DIFFERENTIAL SATISFACTION GROUPS

Intervals	Frequency		
	"More Satisfied"	"Less Satisfied"	Total
2.85 - 3.00	1	0	1
2.70 - 2.84	0	1	1
2.55 - 2.69	1	0	1
2.40 - 2.54	2	0	2
2.25 - 2.39	1	1	2
2.10 - 2.24	2	0	2
1.95 - 2.09	3	5	8
1.80 - 1.94	1	3	4
1.65 - 1.79	2	1	3
1.50 - 1.64	2	2	4
1.35 - 1.49	4	5	9
1.20 - 1.34	2	2	4
1.05 - 1.19	2	0	2
Total	23	20	43

TABLE 70

COMPARISON OF THE "MORE SATISFIED" AND "LESS SATISFIED" 4-H CLUB AGENTS WITH RESPECT TO TECHNICAL GRADE-POINT AVERAGE

Statistic	"More Satisfied"	"Less Satisfied"
N	23	20
$\bar{X}$	1.824	1.759
σ (a)	.5172	.3719
σ^2	.2675	.1383
	F = 1.93	
	t = .467	

(a) Unbiased estimates of the population variance and standard deviation.

(Neither of the above tests of homogeneity is significant at the 5 per cent level).

"more satisfied" agents. The actual range of hours was from 0 to 78.

Application of the tests of homogeneity are presented in Table 72 (page 263). The computed F-ratio indicated that the two groups were homogeneous with respect to variance. Application of the t-test revealed that the difference in means was not large enough to be considered significant.

These results indicate that the amount of work taken by these agents in technical agriculture was not significantly related to their job satisfaction.

Comparison of 4-H Club Agents who majored in various fields of emphasis in college with respect to measured job satisfaction. The major purpose of this part of the research was to determine whether or not there were any significant differences in the job satisfaction scores of the 4-H Club Agents who had majored in various fields of emphasis in college. Table 73 (page 264) presents the distribution of the "more satisfied" and "less satisfied" 4-H Club Agents according to their fields of emphasis.

In Chapter V the responses to the Job Satisfaction Questionnaire were studied to determine the scalability of these responses. Because the attitude being measured was found to be multi-dimensional, the raw scores on the questionnaire were used to divide the agents into differential satisfaction groups. For the same reason, the raw scores on the Job Satisfaction Questionnaire were used in the study of the job satisfaction differences between the agents in the various fields of emphasis.

TABLE 71

DISTRIBUTION OF THE NUMBER OF HOURS OF TECHNICAL AGRICULTURE TAKEN BY 4-H CLUB AGENTS, DIVIDED ACCORDING TO DIFFERENTIAL SATISFACTION GROUPS

Intervals	Frequency		
	"More Satisfied"	"Less Satisfied"	Total
77 - 83	0	1	1
70 - 76	0	0	0
63 - 69	2	0	2
56 - 62	3	2	5
49 - 55	1	0	1
42 - 48	6	9	15
35 - 41	2	4	6
28 - 34	3	2	5
21 - 27	2	1	3
14 - 20	1	0	1
7 - 13	2	1	3
0 - 6	4	2	6
Total	26	22	48

TABLE 72

COMPARISON OF THE "MORE SATISFIED" AND "LESS SATISFIED" 4-H CLUB AGENTS WITH RESPECT TO THE NUMBER OF HOURS OF TECHNICAL AGRICULTURE TAKEN DURING COLLEGE

Statistic	"More Satisfied"	"Less Satisfied"
N	26	22
$\bar{X}$	33.69	38.50
σ (a)	20.490	17.372
σ^2	419.82	301.79
	F = 1.39	
	t = .869	

(a) Unbiased estimates of the population variance and standard deviation.

(Neither of the above tests of homogeneity is significant at the 5 per cent level).

TABLE 73

DISTRIBUTION OF THE "MORE SATISFIED" AND "LESS SATISFIED" 4-H CLUB AGENTS ACCORDING TO THEIR FIELDS OF EMPHASIS IN COLLEGE

Field of Emphasis	Majors Included in Fields	Frequency		
		"More Satisfied"	"Less Satisfied"	Total
0	No College Work	0	0	0
1	Soils, Crops & Agronomy	4	0	4
2	Farm Management Agricultural Economics	1	0	1
3	Animal Husbandry Dairy, Dairy Husbandry Dairy Products Dairy Production Dairy Manufacturing Poultry Husbandry	5	12	17
4	Agricultural Engineering Farm Engineering	1	2	3
5	Horticulture Pomology Apiculture	1	1	2
6	Agricultural Education	3	1	4
8	Forestry	1	1	2
9	Non-agricultural	7	3	10
11	Agricultural Extension	3	2	5
	Total	26	22	48

First, the groups representing the various fields of emphasis were tested for homogeneity of variance to determine whether or not they met this basic assumption involved in using analysis of variance. Only those fields of emphasis which were represented by at least two individuals were included in this test. Following the procedure described in Part I of this chapter, Bartlett's M-test was applied, using the corrective factor, C, for the small sample. This calculated value was found to be significant at the 5 per cent level, indicating that the estimates of population variance based on the eight fields of emphasis might be significantly different.

This finding eliminated the possibility of using analysis of variance for determining whether the differences in the mean job satisfaction scores of the various fields of emphasis are significant of real differences, or may be explained away in terms of chance fluctuations in random sampling. As a result, Chi-square was applied to measure the differences in job satisfaction of these fields.

The total group of 4-H Club Agents was divided into groups of 26 "more satisfied" and 22 "less satisfied" agents. If field of emphasis played no part in job satisfaction, the agents in each area of emphasis would be divided according to this same proportion. Accordingly, 54.16 per cent of the 4-H Club Agents who majored in each field of emphasis would be classified in the "more satisfied" group.

Table 74 (page 266) shows the results of the comparison of the various fields of emphasis. Chi-square was applied here to measure the divergence of the observed frequencies in each field of emphasis

who were classified as "more satisfied" from the set of theoretical frequencies based upon the proportion of the total sample classified as "more satisfied." The derived value of Chi-square, 2.9938, was not significant, providing adequate basis for accepting the hypothesis that field of emphasis was not significantly related to the job satisfaction of this group of 4-H Club Agents.

TABLE 74

COMPARISON OF 4-H CLUB AGENTS WHO MAJORED IN VARIOUS FIELDS OF EMPHASIS WITH RESPECT TO JOB SATISFACTION

Field of Emphasis	Observed Frequency in "More Satisfied"	Expected Frequency	$\frac{(f_o-f_e)^2}{f_e}$
3	5	9.21	1.9244
9	7	5.416	.4632
X[a]	14	11.374	.6062
		Chi-square =	2.9938
		d. f. = 2	

(a) Group X contains fields 0, 1, 2, 4, 5, 6, 8, and 11. These groups were combined because Chi-square should not be applied to groups whose expected frequency is less than five.

(The Chi-square value above is not significant at the 5 per cent level).

Summary of Chapter VIII

This chapter has been concerned with an analysis of the relationship between the five academic factors and the measured job satisfaction of the 81 County Agents and 48 4-H Club Agents. The independent variables used in this study were: ACE decile scores, all-college grade-point averages, technical agriculture grade-point averages, number of hours of technical agriculture taken in college, and college major or field of emphasis. The County Agents and the 4-H Club Agents were studied separately.

In order to study these relationships, the 81 County Agents were divided into variable satisfaction groups of 44 "more satisfied" and 37 "less satisfied" agents on the basis of their scaled scores on the Job Satisfaction Questionnaire.

For the group of 26 County Agents for whom ACE scores were available it was found that there were no significant differences between the differential satisfaction groups with respect to mean ACE decile rank. Study of the homogeneity of the agents with ACE scores and those without ACE scores revealed that the 26 agents studied could not be considered representative of the entire group until further observations are made relative to the academic aptitude of the entire group of County Agents.

There were no significant differences between the variable satisfaction groups with regard to all-college grade-point average.

Study of the technical grade-point averages of the County Agents revealed that eight of the nine agents who averaged below 1.35 were

classified as "more satisfied" agents. In spite of this trend, there was not a significant difference in the means of the variable satisfaction groups.

The number of hours of technical agriculture taken by the agents when they were in college was not significantly related to their attitudes toward the job, as measured by the questionnaire.

Further study revealed that there were no significant differences in the job satisfaction scores among the agents who majored in various fields of emphasis in college.

The total group of 4-H Club Agents were divided into groups of 26 "more satisfied" and 22 "less satisfied" agents on the basis of their raw scores on the Job Satisfaction Questionnaire. These two groups were then compared with respect to the five variables.

ACE scores were available for 36 of the 48 4-H Club Agents. Examination of the distribution of these agents over the 10 deciles revealed that none of the individuals in the "more satisfied" group scored above the sixth decile, while four of the "less satisfied" group scored above this level. In addition, seven of the ten men who ranked in the first and second deciles were in the "more satisfied" group of 4-H Club Agents. These findings indicated a trend toward dissatisfaction on the part of the agents with higher academic ability. In spite of this trend, the variable satisfaction groups did not differ significantly with reference to mean ACE decile score. By comparing the group of 36 4-H Club Agents for whom ACE scores were available and the group without ACE scores, it was decided that these results could be interpreted as representative of the entire group.

It was also found that there was no significant difference between the "more satisfied" and "less satisfied" agents with respect to mean GPA.

Inspection of the distribution of the technical grade-point averages revealed that seven of the nine 4-H Club Agents who had TGPA's above 2.09 were classified as "more satisfied" agents. However, the variable satisfaction groups were not significantly different with respect to mean TGPA.

Additional study showed that the number of hours of technical agriculture that these agents took while in college did not differ significantly for the two groups.

There were no significant differences in the measured job satisfaction of the agents who majored in various fields of emphasis in college.

CHAPTER IX

SUMMARY, CONCLUSIONS, AND IMPLICATIONS FOR FURTHER RESEARCH

The present chapter presents a summary of the investigations which were made in this study, conclusions that were framed as a result of these investigations, and implications for further related research.

Summary

The Problem. Early in 1950, a research committee was appointed by the Michigan Extension Service to study the differential characteristics of successful extension workers. As a first stage in this over-all research project, the Committee decided to analyze the data available on the County Agricultural Agents and County 4-H Club Agents with respect to the relationship between certain of their personal characteristics and various criteria of their work adjustment. The personal factors selected for study were: biographical data, vocational interests, academic backgrounds, and personality traits. The criteria of work adjustment selected for study were: rated work effectiveness and measured job satisfaction.

The major purpose for the over-all research project was to obtain information that would help the Michigan Extension Service select County Agents and 4-H Club Agents who will be effective on the job and will be satisfied with their work.

The purpose of this particular investigation was to determine the academic status and background of the County Agents and 4-H Club Agents presently employed in Michigan and to analyze the relationship between these data and the work effectiveness and job satisfaction of the agents. The following five aspects of academic background were selected for study: scores on the American Council on Education Psychological Examination, all-college grade-point averages, technical grade-point averages, number of hours of technical agriculture taken in college, and college majors.

In reviewing the professional literature, it was discovered that no studies were available which investigated the relationship of academic factors to work adjustment among extension workers. However, studies of these relationships in other occupations revealed, in some instances, rather high correlation between academic aptitude and work effectiveness, and academic aptitude and job satisfaction. In general, it was found that these relationships varied from one occupation to another. Several studies also found significant relationships between grades and work effectiveness and job satisfaction. In these studies, correlations varied from a negative relationship to rather high positive relationships depending upon the occupation being studied and the criteria used.

Methodology. The samples used for this study consisted of 81 County Agents and 48 4-H Club Agents. These samples represented all of the 4-H Club Agents and County Agents who were employees of the Michigan Extension Service on September 1, 1950, with the exception

of several agents who retired, died, or resigned between that date and the date when the last of the data necessary for the study was obtained from the agents.

Data relevant to the academic backgrounds of these agents were obtained from the transcripts and personnel records of the agents and from the test files of the various colleges and universities that the individuals had attended. These data were then copied onto master data sheets and finally punched into IBM cards. From this information, all-college grade-point averages and technical grade-point averages were computed.

The method used in evaluating work effectiveness of the County Agents involved a rating by the subject matter specialists of the Michigan Extension Service, plus a final forced ranking of the 81 agents into four approximately equal work effectiveness groups by a panel of seven extension administrators. The final ranking of the 4-H Club Agents by this same panel considered specialists' ratings, 4-H Club Allocations ratings, and the ratings arrived at by calculating the proportion of eligible boys and girls that are enrolled in 4-H Club work in the separate counties. These various criteria were interpreted by the panel in light of additional information available to them. On the basis of these administrative ratings, the two groups of agents were divided into variable work effectiveness groups. The top three-quarters of each group of agents were called "more successful" agents and the bottom quarter of each group were classified as "less successful" agents. There was found to be high agreement

among the judges on their ratings of the agents' work effectiveness.

The degree of job satisfaction of the agents was determined by their scores on the Job Satisfaction Questionnaire, an adaptation of the Hoppock Job Satisfaction Blank. The Questionnaire was found to have reliability well above the minimal adequate level of reliability necessary for group study. On the basis of the scores on this Questionnaire, the two groups of agents were divided into relatively equal groups of "more satisfied" and "less satisfied" agents. These variable satisfaction groups were found to be homogeneous with respect to age in both groups of agents, but the "more satisfied" County Agents and 4-H Club Agents were found to have been on the job a significantly longer period of time than the "less satisfied" agents.

Analysis of the relationship between work effectiveness and job satisfaction revealed that they were relatively independent criteria. This finding further emphasized the need for separate studies of these two criteria.

The primary purpose of the statistical procedures used in this study was to determine the relationship between the five independent variables or academic factors and the two dependent variables of work effectiveness and job satisfaction. Because there were two dependent variables, parallel sets of statistical procedures were necessary. The variable work effectiveness groups were compared with respect to the different aspects of academic background, and then the variable job satisfaction groups were compared with respect to these factors. The County Agents and 4-H Club Agents were considered separately in

these comparisons.

The principle statistics used in this study were the F-ratio and the t-test to determine the significance of the differences in means and variances of the differential success groups and of the differential satisfaction groups for the first four variables: ACE scores, all-college grade-point averages, technical grade-point averages, and number of hours of technical agriculture. When the variable success and satisfaction groups were found to lack homogeneity of variance, the Behrens-Fisher d-test was used to test the difference in means.

In studying the relationship between college major and rated success, Chi-square was used. To study the relationship between college major and job satisfaction, two different statistical procedures were used. The County Agents, when grouped according to field of emphasis in college, were found to be homogeneous with respect to variance of satisfaction scores. Consequently, analysis of variance was used. However, the 4-H Club Agents, grouped the same way, were not homogeneous with respect to job satisfaction scores, so it was not possible to use analysis of variance. Chi-square was used instead.

Findings. On the basis of the investigation previously reported, the following important findings are listed:

(a) Approximately 94 per cent of the total group of County Agents and 4-H Club Agents are college graduates and approximately 23 per cent of them have completed some

graduate work. Of the County Agents, 96.30 per cent have had some college education and 93.83 per cent of them are college graduates, while all of the 4-H Club Agents have had some college education and 93.75 per cent of them are college graduates. Only three County Agents did not attend college at all.

The range of ACE decile ranks was from the first to the ninth decile in both groups of agents.[1] The average decile rank for County Agents and for 4-H Club Agents was the fourth decile, indicating that the average individual studied was slightly below the average for his entering college Freshman class.

All-college grade-point averages ranged from .76 to 2.53 for the County Agents and from 1.00 to 2.44 for the 4-H Club Agents. The average of the GPA's was approximately 1.5 for both groups, or about half way between a C and a B.

Seventy-four County Agents and 43 4-H Club Agents took courses in technical agriculture. Their grade-point averages ranged from 1.97 to 2.79 for the County Agents and from 1.14 to 3.00 for the 4-H Club Agents. Thus,

---

[1] These findings are based on the 26 County Agents and 36 4-H Club Agents for whom ACE scores were available.

the grades ranged from slightly below a C for the County Agents and slightly above a C for the 4-H Club Agents to almost a straight A for both groups. The average grade was approximately 1.8 for both groups, or slightly below a B.

The number of credit hours of technical agriculture ranged from 0 to 82 for the County Agents and from 0 to 78 for the 4-H Club Agents. The average number of hours for the County Agents was 43.17 and the average for the 4-H Club Agents was 35.90.

Of the 75 County Agents who graduated from college, only two received non-agricultural degrees. Of the 45 4-H Club Agents who graduated, two received degrees without declaring majors, and five received other non-agricultural degrees. More agents had majored in Animal Husbandry than in any other single major: 17 County Agents and nine 4-H Club Agents. The next largest group was in Farm Crops: 13 County Agents and three 4-H Club Agents.

(b) There are no significant differences between the "more successful" and "less successful" County Agents with respect to mean ACE decile rank (scores available for only 26 agents), mean GPA, mean TGPA, or mean number of hours of technical agriculture taken in college. There are no significant differences in the success ratings of

the County Agents who majored in various fields of emphasis in college.

(c) In the sample of 36 4-H Club Agents for whom ACE scores were available, the "more successful" agents had neither significantly higher nor lower mean scores on the ACE than the "less successful" 4-H Club Agents. However, significant trends were present in the frequency distribution of these agents over the 10 deciles. The top four 4-H Club Agents on the ACE were in the "more successful" group and 15 of the top 17 4-H Club Agents on the ACE were in the "more successful" group. No agents in the "less successful" group of 4-H Club Agents ranked above the sixth decile.

There are no significant differences between the variable success groups of 4-H Club Agents with respect to mean GPA. However, a significant trend was present in the frequency distribution. No agents in the "less successful" group of 4-H Club Agents averaged above 1.79, while five of the "more successful" agents averaged above this level.

Only one of the nine "less successful" 4-H Club Agents had a technical grade-point average above 1.94, while 16 of the 34 "more successful" agents averaged above that level. There is no significant difference in mean TGPA

between the variable success groups.

There are no significant differences between the "more successful" and "less successful" 4-H Club Agents with respect to mean number of hours of technical agriculture. However, all six of the agents who had taken less than two credit hours of technical agriculture were classified in the "more successful" group.

There are no significant differences in the success ratings of the 4-H Club Agents who majored in various fields of emphasis in college.

(d) For the sample of 26 County Agents for whom ACE scores were available, there are no significant differences between the "more satisfied" and "less satisfied" agents with respect to mean decile rank on the ACE.

There are no differences between the variable satisfaction groups with regard to all-college grade-point average.

Eight of the nine agents who had technical grade-point averages below 1.35 were classified as "more satisfied" agents. However, there is not a significant difference between the "more satisfied" and "less satisfied" County Agents with respect to mean TGPA.

The variable satisfaction groups of County Agents do not differ significantly with respect to mean number of hours of technical agriculture.

There are no significant differences in the job satisfaction scores of the County Agents who majored in various fields of emphasis.

(e) For the 36 4-H Club Agents for whom ACE scores were available, there are no significant differences with respect to mean ACE decile rank. However, an important trend exists in the distribution of these agents over the 10 deciles. None of the agents in the "more satisfied" group ranked above the sixth decile, while four of the "less satisfied" agents ranked above this level. In addition, seven of the 10 agents who ranked in the first and second deciles were in the "more satisfied" group of 4-H Club Agents. These findings are indicative of a trend toward dissatisfaction on the part of the agents with higher academic aptitude.

There is no significant difference in mean GPA between the "more satisfied" and "less satisfied" 4-H Club Agents.

Seven of the nine 4-H Club Agents who had TGPA's above 2.09 were classified as "more satisfied." However,

the variable satisfaction groups are not significantly different with respect to mean TGPA.

The number of technical agriculture hours taken by the agents while in college are not significantly different for the variable satisfaction groups.

There are no significant differences in the job satisfaction scores of the 4-H Club Agents who majored in various fields of emphasis.

Conclusions

On the basis of the findings in this investigation, the following conclusions have been drawn:

(a) Although a few of the County Agents and 4-H Club Agents in Michigan can be classified as being indifferent to their jobs or dissatisfied with their jobs, the large majority of the agents are fairly well satisfied with the type of work in which they are engaged.

(b) The description of the academic backgrounds of the extension workers included in this study should prove valuable in understanding the beliefs, attitudes, behavior, personal adjustment, and work adjustment of the agents.

(c) The work situations of the County Agents and the 4-H

Club Agents are noticeably different. Because of these differences, certain significant trends might be considered in the future selection of 4-H Club Agents that do not necessarily apply to County Agents. 4-H Club Agents with high academic aptitude tend to be successful on the job. However, a strange contradiction exists with regard to job satisfaction and academic aptitude. 4-H Club Agents with high academic aptitude tend to be less satisfied with their work than do agents with low academic aptitude. Other studies of job satisfaction and aptitude have shown that individuals with high academic aptitude tend to be dissatisfied with jobs that are not sufficiently challenging. In light of this evidence, it seems justifiable to conclude that 4-H Club work may not prove challenging to men with high academic ability.

The lack of significant difference in mean ACE decile ranks between the variable success and satisfaction groups hides the differences in extremes. Nevertheless, these trends are worthy of serious consideration. However, if agents were selected on this basis in an attempt to choose men who would be successful on the job, the group would also tend to be dissatisfied with the work. This dissatisfaction would tend to increase the rate of turn-over, and thus the question arises as to whether such selection would be advisable.

These trends are still in need of further validation by studying the academic aptitudes of future agents and by cross-validation studies with agents in other states. Both of these studies are included in the plans of the over-all Research Committee.

(d) Any extension selection procedure based upon all-college grades seems to be based upon inadequate evidence. Evidently, scholarship has less relationship with work effectiveness and job satisfaction among extension agents than do other personal characteristics or such contingency factors as the work situation in which the agent finds himself when he is actually employed on the job.

(e) Although there were no significant differences in mean TGPA for the variable success and satisfaction groups, selection procedures based upon a cutting score in the neighborhood of 1.94 to 2.09 would seem justifiable for selecting 4-H Club Agents. While such a cutting score would eliminate many men who might be effective as 4-H Club Agents and satisfied with their work, it would likely select a higher per cent of "more satisfied" and "more successful" agents than would random selection. In the group of 4-H Club Agents studied in this investigation, 16 of the 34 "more successful" agents averaged above 1.94, while only one of the nine "less successful"

agents averaged above this point. In addition, seven of the nine 4-H Club Agents who averaged above 2.09 in their technical agriculture courses were classified as "more satisfied."

Because most of the County Agents are selected from the ranks of the 4-H Club Agents, it is difficult to explain why the trend toward greater effectiveness on the part of 4-H Club Agents with high TGPA did not evidence itself in the County Agent group and why the satisfaction trend was reversed: in the County Agent sample, eight of the nine agents who averaged below 1.35 on technical agriculture courses were classified as "more successful." Part of this difference might be due to the changed work situation on the new job. The difference in the jobs call for different abilities, different activities, and, at times, different personalities.

(f) Selection procedures based upon the number of hours of technical agriculture that an individual has taken while in college seem to be based upon insufficient evidence. In fact, certain findings would seem to oppose such procedures. For example, five of the seven County Agents who had taken no courses in technical agriculture were classified as "more successful" agents and all six of the 4-H Club Agents who had taken one course or less of technical agriculture were classified as "more successful" agents.

(g) There is inadequate evidence for selecting extension agents on the basis of their college majors. Any variations observed in the work effectiveness ratings and job satisfaction scores of the individuals who majored in various fields of emphasis could be attributed to chance variation from sample to sample.

Implications for Further Research

A few of the studies which might be undertaken in order to complement the findings of this investigation and make the findings of greatest value in the guidance and selection of prospective County Agents and 4-H Club Agents are listed below:

(a) In order to complement the findings of this study, it would be valuable for the Michigan Extension Service to originate a long-term study of all of the men employed by the Michigan Extension Service, both those presently employed and those who are employed in future years. To facilitate such a study, it would be advisable to obtain complete academic records for all men who are accepted for positions as extension agents. When an individual was moved from one job to another within the Extension Service, a record should be made of the transfer and the basis for such a transfer. When any agent left the employ of the Extension Service, an exit interview and other means might be used to determine the reasons for the agent's leaving: did he quit because he was dissatisfied with the work, was he asked to resign because of

ineffectiveness, did he quit to take a better job, and so forth. Such a study would include not only the men presently employed by the Extension Service, but also men who had left the Service for various reasons. The present investigation was limited to the extent that it excluded many extremely successful men who had been promoted or had taken better jobs, a number of unsuccessful men who had been asked to resign, and a number of dissatisfied men who had resigned voluntarily.

(b) Included as part of the above study or as a separate study would be a follow-up of the "less satisfied" County Agents and 4-H Club Agents. The findings in the present investigation revealed that the "more satisfied" agents had been on the job a significantly longer period of time than the other group. This might be due to the fact that agents become more satisfied as they stay on the job longer. However, it might be significant of the fact that the "less satisfied" agents leave the job sooner than do others.

(c) A valuable related study might investigate the relationship between work adjustment criteria and other academic factors such as: extra-curricular activities, method of financing college education, critical thinking ratio, and number of credit hours and grades in such fields as speech,

sociology, and psychology.

(d) It is suggested that a study be made of the validity of the Job Satisfaction Questionnaire in terms of other measures of job satisfaction such as overt actions, participation in various activities, membership in various organizations, and other such commitments.

(e) Another study might investigate the relationship between these academic factors and work adjustment for individuals in similar fields of endeavor such as: teachers of vocational agriculture, extension specialists, and home demonstration agents.

(f) The outcomes of the present investigation suggest the value of an investigation of part-scores on the ACE as possible predictors of work adjustment.

(g) Cross-validation studies are needed for further clarification of the findings of this investigation. Such studies might include agents from other states and the future agents in Michigan.

BIBLIOGRAPHY

Adams, W. M., "Prediction of Scholastic Success in the College of Law," Educational and Psychological Measurement, 1944, Vol. 4, pp. 13-19.

Anderson, J. E., and L. T. Spenser, "The Predictive Value of the Yale Classification Tests," School and Society, 1926, Vol. 24, pp. 305-312.

Anderson, V. V., Psychiatry in Industry, New York: Harper and Brothers, 1929, 364pp.

Anonymous, Factors Affecting the Satisfaction of Home Economics Teachers, American Vocational Association Research Bulletin, No. 3, Washington, D. C., Committee on Research Publications, American Vocational Associations, Inc., (May 1948), 96pp.

Barnes, M. W., "Gaines in the A.C.E. Psychological Examination During the Freshman-Sophomore Years," School and Society, 1943, Vol. 57, pp. 250-252.

Benton, A. L., and J. D. Perry, "A Study of the Predictive Value of the Stanford Scientific Aptitude Tests," Journal of Psychology, 1940, Vol. 10, pp. 309-312.

Berdie, R. F., "Prediction of College Achievement and Satisfaction," Journal of Applied Psychology, 1944, Vol. 28, pp. 239-245.

Bingham, W. V., and W. T. Davis, "Intelligence Test Scores and Business Success," Journal of Applied Psychology, 1924, Vol. 8, pp. 1-22.

Bohan, J. E., "Students' Marks in College Courses," (Unpublished Ph.D. thesis, University of Minnesota, Minneapolis, 1926).

Bolenbaugh, Lawrence, and W. M. Proctor, "Relation of the Subjects Taken in High School to Success in College," Journal of Educational Research, 1927, Vol. 15, pp. 87-92.

Borow, H., "The Measurement of Academic Adjustment," Journal of the American Association of Collegiate Registrars, 1947, Vol. 22, pp. 274-286.

Bransford, T. L., et al., "A Study of the Validity of Written Tests for Administrative Personnel," American Psychologist, 1946, Vol. 7, p. 279 (abstract).

Brayfield, Arthur H., "The Interrelationship of Measures of Ability, Aptitude, Interests, and Job Satisfaction Among Clerical Employees," (Unpublished Ph.D. thesis, University of Minnesota, Minneapolis, 1946).

Brown, Clara M., Evaluation and Investigation in Home Economics, New York: F. S. Crofts and Company, 1941, 33pp.

Brush, Edward N., "Mechanical Ability as a Factor in Engineering Aptitude," Journal of Applied Psychology, 1941, Vol. 25, pp. 300-312.

Butsch, R. L. C., "Improving Prediction of Academic Success Through Differential Weighting," Journal of Educational Psychology, 1939, Vol. 30, pp. 401-420.

Byrns, R. K., and V. A. C. Henmon, "Long Range Prediction of College Achievement," School and Society, 1935, Vol. 41, pp. 877-880.

Clark, Raymond M., "Factors Associated With Decisions of Michigan Teachers to Remain in or to Leave the Field of Teaching Vocational Agriculture," (Unpublished Ed.D. thesis, Michigan State College, East Lansing, Michigan, 1950).

Crane, Esther, "Reports of Some Psychological Tests by Bryn Mawr College," School and Society, 1927, Vol. 25, pp. 640-644.

Crawford, A. B., and P. S. Burnham, "Entrance Examinations and College Achievement," School and Society, 1932, Vol. 36, pp. 344-352.

DeCamp, J. E., "Studies in Mental Tests," School and Society, 1921, Vol. 14, pp. 254-258.

Doob, L. W., Public Opinion and Propaganda, New York: Henry Holt and Company, 1948, 600pp.

Douglass, H. R., The Relation of High School Preparation and Certain Other Factors to Academic Success at the University of Oregon, University of Oregon Publications, Educational Series 3, No. 1, 1931.

_____, and L. A. Lovegren, "Prediction of Success in General College," (Unpublished study, University of Minnesota, Minneapolis, 1937).

_____, L. J. Luker, and L. A. Lovegren, "Prediction of Success in Law School," University of Minnesota Studies in Predicting School Achievement, Part II, University of Minnesota Press, Minneapolis, 1942, pp. 46-60.

Dubois, P. H., "Achievement Ratios of College Students," Journal of Educational Psychology, 1939, Vol. 30, pp. 699-702.

Durflinger, G. W., "The Prediction of College Success--A Summary of Recent Findings," Journal of the American Association of Collegiate Registrars, 1943, Vol. 19, pp. 68-78.

Edds, H. J., and W. M. McCall, "Predicting the Scholastic Success of College Freshmen," Journal of Educational Research, 1933, Vol. 27, pp. 127-131.

Eysenk, H. J., and S. Crown, "An Experimental Study in Opinion-Attitude Methodology," International Journal of Opinion and Attitude Research, Vol. 3 (Spring 1949) pp. 47-86.

Finch, F. H., and C. L. Nemzek, "Prediction of College Achievement from Data Collected During the Secondary School Period," (Unpublished paper, University of Minnesota, Minneapolis, 1934).

Flemming, E. G., "College Achievement, Intelligence, Personality and Emotion," Journal of Applied Psychology, 1932, Vol. 16, pp. 668-674.

Garret, H. E., Statistics in Psychology and Education, New York: Longmans, Green, and Co., 1937, 493 pp.

Garrett, W. S., "Ohio State Psychological An Instrument for Predicting Success in a Teachers College," Occupations, 1944, Vol. 22, pp. 489-495.

Gerberich, J. R., "Validation of a State-wide Educational Guidance Program for High-School Seniors," School and Society, 1931, Vol. 34, pp. 606-610.

Guiler, W. S., "The Predictive Value of Group Intelligence Tests," Journal of Educational Research, 1927, Vol. 16, pp. 365-374.

Guttman, Louis, "The Cornell Technique for Scale and Intensity Analysis," Educational and Psychological Measurement, 1947, Vol. 7, pp. 247-279.

Harrell, Willard, "Testing Cotton Mill Supervisors," Journal of Applied Psychology, 1940, Vol. 24, pp. 31-35.

Hartson, L. D., "Influence of Level of Motivation on the Validity of Tests," Educational and Psychological Measurement, 1945, Vol. 5, pp. 273-283.

_____, "The Validation of the Rating of 23 Tests for Predicting Freshman Scholarship at Oberlin College," School and Society, 1932, Vol. 36, pp. 413-416.

_____, and A. J. Sprow, "Value of Intelligence Quotients Obtained in Secondary School for Predicting College Scholarship," Educational and Psychological Measurement, 1941, Vol. 1, pp. 387-398.

Hoppock, Robert, Job Satisfaction, New York: Harper and Brothers, 1935, 303 pp.

Hortog, P., and E. C. Rhodes, An Examination of Examinations, International Institute Examinations Inquiry, London: Macmillan and Company, Ltd., 1935.

Hunter, E. C., "Changes in Scores of College Students on the A.C.E. Psychological Examination at Yearly Intervals," Journal of Educational Research, 1942, Vol. 36, pp. 284-291.

James, A. W., "The Effect of Handwriting on Grading," English Journal, 1927, Vol. 16, pp. 180-205.

Johnson, Palmer O., Statistical Methods in Research, New York: Prentice-Hall, Inc., 1949, 377pp.

Johnson, Walter F., "A Study of the Efficiency of Certain Factors for Predicting Achievement of Veterans at the Junior College Level in the College of Science, Literature and the Arts at the University of Minnesota, (Unpublished Ph.D. thesis, University of Minnesota, Minneapolis, 1950), 191pp.

Jones, J. W., Study of Certain Problems Dealing With Scholastic Achievement in a Teachers College, Indiana University School of Education Bulletin, No. 5, (April 1929), pp. 33-40.

Jones, R. D., "Prediction of Teaching Efficiency From Objective Measures," Journal of Experimental Education, 1946, Vol. 15, pp. 85-99.

Kinney, L. B., A Summary of the Literature on the Use of Intelligence Tests in Colleges and Universities, University of Minnesota Committee on Educational Research, Minneapolis: University of Minnesota Press, 1932.

Kornhauser, A. W., and A. A. Sharp, "Employee Attitudes: Suggestions from a Study in a Factory," Personnel Journal, 1932, Vol. 10, pp. 393-404.

Kretch, D. and R. S. Crutchfield, Theory and Problems of Social Psychology, New York: McGraw-Hill, Inc., 1948, 639pp.

Kriner, H. L., "Five-Year Study of Teachers College Admissions," Educational Administration and Supervision, 1937, Vol. 23, pp. 192-199.

Laycock, S. R., and N. B. Hutcheon, "A Preliminary Investigation into the Problem of Measuring Engineering Aptitude," Journal of Educational Psychology, 1939, Vol. 33, pp. 280-289.

Lindquist, E. F., Statistical Analysis in Educational Research, New York: Houghton-Mifflin Company, 1940, 266pp.

Lins, L. J., "The Prediction of Teaching Efficiency," Journal of Experimental Education, 1946, Vol. 15, pp. 2-60.

McNelly, C. L., A Study of the County Agent Work Pattern, St. Paul: University of Minnesota Press, 1949.

Mandell, M., and D. C. Adkins, "Validity of Written Tests for the Selection of Administrative Personnel," Educational and Psychological Measurement, 1946, Vol. 6, pp. 293-312.

May, M. A., "Predicting Academic Success," Journal of Educational Psychology, 1923, Vol. 14, pp. 429-440.

Moore, H., Psychology for Business and Industry, New York: McGraw-Hill, Inc., 1942, Chapter 16.

Murphy, G., L. B. Murphy, and T. M. Newcombe, Experimental Social Psychology, New York: Harper and Brothers, 1937, 1121 pp.

Nelson, M. J., "Some Data From Freshman Tests," School and Society, 1933, Vol. 37, pp. 262-264.

Odell, C. W., "An Attempt at Predicting Success in the Freshman Year in College," School and Society, 1927, Vol. 25, pp. 702-706.

Oppenheimer, Celia, and R. F. Kimball, "Ten-Year Follow-up of 1937 H. S. Graduates," Occupations, 1947, Vol. 26, pp. 228-234.

Peiser, Walter G., "The Prognostic Value of the American Council on Education Psychological Examination," (Unpublished Ph.D. thesis, Louisiana State University, Baton Rouge, 1937).

Pierson, C. D., and C. H. Nettels, "A Study of High School Seniors to Determine Who Shall be Admitted to College," School and Society, 1928, Vol. 28, pp. 215-216.

Pond, Millicent, and M. A. Bills, "Intelligence and Clerical Jobs; Two Studies of Relation of Test Scores to Job Held," Personnel Journal, 1933, Vol. 12, pp. 41-56.

Prescott, A. C., and O. K. Garretson, "Teachers' Estimates of Success in College," School Review, 1940, Vol. 48, pp. 278-284.

Proctor, W. M., "The High School's Interest in Methods of Selecting Students for College Admission," School and Society, 1925, Vol. 23, pp. 441-448.

_____, "Intelligence and Length of Schooling in Relation to Occupational Levels," School and Society, 1935, Vol. 42, pp. 783-786.

Prosser, M. R., "Study of Scholastic Performance of Freshmen Women at the University of Iowa," University of Iowa Studies in Education, Iowa City: University of Iowa, 1930.

Quayle, M. S., "A Study of Some Aspects of Satisfaction in the Vocation of Stenography," Teachers College, Columbia University Contributions to Education, No. 659, New York: Bureau of Publications, Teachers College, Columbia University, 1935.

Read, C. B., "Prediction of Scholastic Success in a Municipal University," School and Society, Vol. 48 (August 1938), pp. 187-188.

Remmers, H. H., and N. L. Gage, Educational Measurement and Evaluation, New York: Harper and Brothers, 1943, 580pp.

Rhinehart, J. B., "An Attempt to Predict the Success of Student Nurses by the Use of a Battery of Tests," Journal of Applied Psychology, 1933, Vol. 17, pp. 277-293.

Rolfe, J. F., "The Measurement of Teaching Ability: Study Number Two," Journal of Experimental Education, 1945, Vol. 14, pp. 52-74.

Root, A. R., "The Thorndike College Entrance Tests, First Semester Grades, Binet Tests," Journal of Applied Psychology, 1923, Vol. 7, pp. 77-92.

Rotsker, L. E., "The Measurement of Teaching Ability: Study Number Two," Journal of Experimental Education, 1945, Vol. 14, pp. 6-51.

Sandiford, Peter, and Others, Forecasting Teaching Ability, University of Toronto, Department of Education Research Bulletin, Number 8, 1937, 93pp.

Scott, W. D., and M. H. S. Hayes, Science and Common Sense in Working With Men, New York: Ronald Press, 1921.

_____, R. C. Clothier, S. B. Mathewson, and W. R. Spriegel, Personnel Management, McGraw-Hill, Inc., 1941, 589pp.

Seagoe, M. V., "Prediction of In-service Success in Teaching," Journal of Educational Research, 1946, Vol. 39, pp. 658-663.

_____, "Prognostic Tests and Teaching Success," Journal of Educational Research, 1945, Vol. 38, pp. 685-690.

Segel, D., Prediction of Success in College, United States Office of Education Bulletin, No. 75, Government Printing Office, Washington, D. C., 1934.

Sheppard, E. M., "The Effect of the Quality of Penmanship on Grades," Journal of Educational Research, 1929, Vol. 19, pp. 102-105.

Smith, F. F., "The Use of Previous Records in Estimating College Success," Journal of Educational Psychology, 1945, Vol. 36, pp. 167-176.

Smith, R. V., "Aptitudes and Aptitude Testing in Dentistry," Journal of Dental Education, 1943, Vol. 8, pp. 55-70; Quoted in Super, D., Appraising Vocational Fitness, 1949.

Snedecor, George W., Statistical Methods, Ames, Iowa: Collegiate Press, 1946, 485pp.

Stalnaker, J. M., "American Council Psychological Examination for 1936 at Purdue University," School and Society, 1928, Vol. 27, pp. 86-88.

Stevens, S. N., and E. F. Wonderlic, "The Relationship of the Number of Questions Missed on the Otis Mental Tests and Ability to Handle Office Detail," Journal of Applied Psychology, 1934, Vol. 18, pp. 364-368.

Stone, C. L., "Disparity Between Intelligence and Scholarship," Journal of Educational Psychology, 1922, Vol. 13, pp. 241-244.

_____, "The Significance of Alpha in College," Journal of Educational Psychology, 1922, Vol. 13, pp. 298-302.

Stone, John T., "A Classification of the Different Occupational Roles Performed by County Agricultural Agents, the Tasks Associated with Each, and the Relative Amount of Time a Model Agent Spends Performing Them," (Unpublished mimeographed report on file in the office of the Michigan Extension Service, July, 1951).

_____, Michigan Cooperative Extension Service: Organization, Development, Policies, East Lansing, Michigan: Michigan State College, 1950.

Stouffer, S. A., L. Guttman, E. A. Suchman, P. F. Lazarsseld, S. A. Star, and J. A. Clausen, Measurement and Prediction, Princeton, N. J.: Princeton University Press, 1950, 756pp.

Stuit, D. B., Personnel Research and Test Development in the Bureau of Naval Personnel, Princeton, N. J.: Princeton University Press, 1947, 513pp.

_____, "The Prediction of Scholarship Success in a College of Medicine," Educational and Psychological Measurement, 1941, Vol. 1, pp. 77-84.

Super, Donald E., Appraising Vocational Fitness, New York: Harper and Brothers, 1949, 727pp.

Taft, R. and A. Mullins, "Who Quits and Why," Personnel Journal, 1946, Vol. 24, pp. 300-307.

Thorndike, Robert L., Personnel Selection, New York: John Wiley and Sons, 1949, 358pp.

Thurstone, L. L., and T. G. Thurstone, Psychological Examination for College Freshmen, Washington, D. C.: American Council on Education, 1943.

_____, and T. G. Thurstone, and D. C. Adkins, "The 1938 Psychological Examination," Educational Record, 1939, Vol. 20, pp. 263-300.

Tiffin, Joseph, and C. H. Lawshe, Jr., "The Adaptability Test," Journal of Applied Psychology, 1943, Vol. 27, pp. 152-163.

Toll, C. H., "Scholastic Aptitude Tests at Amherst College," School and Society, 1928, Vol. 28, pp. 524-528.

Votaw, D. F., "A Comparison of Test Scores of Entering College Freshmen as an Instrument for Predicting Subsequent Scholarship," Journal of Educational Research, 1946, Vol. 40, pp. 215-218.

Wadsworth, Guy W., Jr., "Tests Prove Worth to a Utility," Personnel Journal, 1935, Vol. 14, pp. 183-187.

Weber, C. O., "Old and New College Board Scores and Grades of College Freshmen," Journal of the American Association of Collegiate Registrars, 1944, Vol. 20, pp. 70-75.

Weintraub, R. G., and R. E. Salley, "Graduation Prospects of an Entering Freshman," Journal of Educational Research, 1945, Vol. 39, pp. 116-126.

Welker, E. L., and T. W. Harrell, "Predictive Value of Certain 'Law Aptitude' Tests," Educational and Psychological Measurement, 1942, Vol. 2, pp. 201-207.

Wesley, S. M., "A Quantitative Study of Job Satisfaction in a Sample of Former University of Minnesota Students," (Unpublished M.S. thesis, University of Minnesota, Minneapolis, 1939).

Whitney, F. L., The Elements of Research, New York: Prentice-Hall, Inc., 1942, 497pp.

_____, and H. W. Leuenberger, "The College Success and Mortality of State Teachers College Freshmen as Related to Intelligence and High School Achievement," Educational Administration and Supervision, 1930, Vol. 16, pp. 668-672.

Williamson, E. G., "The Significance for Educational Guidance of Personal Histories," School Review, 1936, Vol. 44, pp. 41-49.

_____, and E. M. Freeman, University of Minnesota Studies in Predicting Scholastic Achievement, Part I, Minneapolis: University of Minnesota Press, 1942.

Wood, B. D., "Measurement in Higher Education," World Book, New York: World Book Company, 1923.

APPENDIX

APPENDIX

Code No. _____

EXTENSION SERVICE RESEARCH PROJECT

SURVEY OF OCCUPATIONAL ATTITUDES

Sponsored by

The Michigan Cooperative Extension Service

WHAT THIS IS: People have varying opinions about their occupations and the work that they do from day to day. Your reactions to the attached questions will be used to help us establish standards for selecting future agents.

WHAT WE WANT YOU TO DO:

1. Enter your name, title, and address on the bottom of the page. This portion of the questionnaire will be removed and replaced by a code number.
2. There are no right or wrong answers.
3. Indicate some answer to every question. It is important that you do not skip any of the questions.

Name _____

Title _____

Address _____

PART I.

Few people can excell in performing all of the different roles or tasks required of county extension agents. Listed below are 11 of the most common kinds of things agents are called on to do. They each require somewhat different abilities and training to perform satisfactorily. From your experience, which of these tasks would you say it was most important for a new agent to show promise of doing particularly well, recognizing they are all important. Rate each role in comparison to the other listed.

Circle E if you feel it is extremely important that an agent be able to perform this role exceptionally well.

Circle V if you feel it is very important that an agent perform this role well.

Circle I if you feel this role is important for an agent to be able to perform satisfactorily.

Circle N if you feel it is not important for an agent to be able to perform this role satisfactorily.

E V I N Acting as a consultant, giving people information and advice as requested.

E V I N Acting as a promoter, stimulating people to action in face to face contact.

E V I N Acting as a demonstrator or public speaker, giving information, talks, lessons, etc. before groups.

E V I N Acting as newspaper reporter or columnist.

E V I N Acting as radio broadcaster.

E V I N Acting as an organizer or arranger of activities or events.

E V I N Acting as a facilitator, or expediter, making it easy or possible for people to follow extension recommendations or programs.

E V I N Acting as administrator, organizing and seeing that things are done, writing reports, etc.

E V I N Performing office details, keeping records, writing reports, filing, etc.

E V I N Acting as student, keeping up to date on new developments, etc.

E V I N Acting as public relations man, maintaining good public relations, keeping up contacts, building useful friendships and good will, etc.

PART II.

This set of questions is widely used to determine how satisfied people are in different kinds of work. We are asking you to fill it out to see if there is a relationship between extension agents' vocational interests and job satisfaction. In addition, we need to know the job satisfaction of county extension workers so that we can use it as a standard against which to compare prospective extension workers. This is <u>not</u> a measure of a person's performance on the job or of his intent to change jobs. It is merely an indication of the satisfaction which the total job provides.

Each question, it should be noted, is made up of two parts. The first part ask <u>how</u> you feel about some element of your work. The second part is an attempt to determine how <u>intensely</u> you feel about it. Be sure to answer both parts of each question.

1. How well do you like your work? (check one)
   _____ I dislike it a great deal
   _____ I don't like it
   _____ I'm indifferent to it
   _____ I like it fairly well
   _____ I like it very much
   _____ I like it better than almost anything else.

   How strongly do you feel about this? (check one)
   _____ Not at all strongly
   _____ Quite strongly
   _____ Very strongly

2. How much of the time do you feel satisfied with your occupation? (check one)
   _____ All of the time
   _____ Almost all of the time
   _____ Most of the time
   _____ A good deal of the time
   _____ Some of the time
   _____ Very little of the time

   How certain are you about this? (check one)
   _____ Very certain
   _____ Fairly certain
   _____ Not at all certain.

3. How do you feel about changing your occupation? (check one)
   _____ Would like very much to get into a completely different occupation.
   _____ Would like to change to some related occupation
   _____ Am not eager to change but would consider changing to a related occupation
   _____ Might consider changing to a closely related occupation
   _____ Would not consider changing
   _____ Undecided.

How sure are you about this? (check one)
_____ Not at all sure
_____ Fairly sure
_____ Very sure

4. How well satisfied are you with your occupation? (Check one)
_____ Much more satisfied than other people
_____ More satisfied than the average person
_____ As well satisfied as most people
_____ Less satisfied than the average person
_____ Much less satisfied than other people

How strongly do you hold this opinion? (check one)
_____ Very strongly
_____ Quite strongly
_____ Not at all strongly

5. How enthusiastic are you about your occupation? (Check one)
_____ Not at all enthusiastic
_____ Only mildly enthusiastic
_____ Quite enthusiastic
_____ Very enthusiastic

How strongly do you feel about this? (check one)
_____ Not at all strongly
_____ Quite strongly
_____ Very strongly

6. How important do you think your work is as compared to that of other professional people? (check one)
_____ Very important
_____ Quite important
_____ Slightly important
_____ Not important at all
_____ Undecided

How sure are you about this?
_____ Very sure
_____ Fairly sure
_____ Not at all sure

7. How interested are you in your work? (check one)
_____ Not interested at all
_____ Only slightly interested
_____ Quite interested
_____ Very interested

How much does being interested in your work mean to you personally? (check one)
_____ Means very little
_____ Means quite a lot
_____ Means a great deal

PART III.

In the job analysis study we are conducting to find ways extension agents use their time it would be unrealistic to omit from careful consideration likes and dislikes. In every job there are things we get a lot of personal pleasure and satisfaction from doing. Other things we do because they need to be done. Your answers will help us to find out what Michigan agents like to do most and what they do because it is expected of them by the job.

Draw a circle around the key letter which best describes your feelings: V if you enjoy very much; S if you get some enjoyment from it; D if you don't enjoy doing it. Example: If you do not like playing the part of a public relations man, circle D.

1.	Acting as a consultant	V	S	D
2.	Acting as a promoter	V	S	D
3.	Acting as an organizer	V	S	D
4.	Acting as newspaper reporter	V	S	D
5.	Acting as radio broadcaster	V	S	D
6.	Acting as administrator	V	S	D
7.	Acting as a demonstrator or public speaker	V	S	D
8.	Acting as a facilitator or expediter	V	S	D
9.	Performing office details	V	S	D
10.	Acting as student	V	S	D
11.	Acting as a public relations man	V	S	D

May 2, 1952

You will recall that we are in the process of a research project that is designed primarily to improve our selection and training of new Agents. The Strong Vocational Interest Blank which you filled out last fall was the first main step in this project. As a second step, we would like to know more about the Agents' attitudes toward their job. The enclosed Survey of Occupational Attitudes has been prepared for this purpose.

I would appreciate it if you would answer this questionnaire and return it to me as soon as possible. The instructions are given on the first page. We simply want your frank answers and nothing you put down will have any bearing on your present or future status in the Extension Service. You will notice that after you return the blank to me your name will be removed and a code number will be replaced so that you will be anonymous to the research workers.

The project is moving along and by the cooperation of each Agent we should soon have some worthwhile information for improving the effectiveness of our organization.

Sincerely yours,

John T. Stone
Specialist in Extension Training

Enclosure

JTS:ba

DATA SHEET

Name	Major	Degree & Date	Birth Date	Total Credits	Total Points	Technical Agr. Credits	Technical Points

No._____

DATA SHEET

Name No.

EXTENSION SERVICE RESEARCH PROJECT

1 Birthdate	2 Appointed	3 Marital status & Children	4 County	5 County Class.	6 Quartile Rating	7 Position Co. Agent or 4-H Agent	8 College of Graduation
9 Graduate Work	10 Psychological Scores	11 G P A	12 TGPA	13 Major	14 Credits	15 Degrees	16
17	18	19	20	21	22	23	24
25	26	27	28	29	30	31	32
33	34	35	36	37	38	39	40

May 2, 1951

Dear Mr. _____:

Michigan State College and the United State Navy are co-sponsoring a research project in Michigan entitled "A Study of the Differential Characteristic of Successful Extension Workers and Other Teachers." This research is being supervised by an inter-departmental committee composed of faculty representatives of the Cooperative Extension Service, Department of Sociology and Anthropology, Institute of Counseling, Testing & Guidance, Education Division, and Department of Written and Spoken English.

As a faculty member of this committee I am carrying out a phase of this research project that deals with an analysis of the college courses, grade-point averages, college majors, and academic aptitude (psychological examination scores).

Because some of the men who are now working in the Extension Service of the state of Michigan have attended colleges or universities other than Michigan State College, it is necessary to ask your help in gathering data. I would appreciate any assistance you might be able to give me in getting the information on the enclosed blanks.

Thank you for your attention to this matter.

Sincerely,

A. Conrad Posz
Dept. of Written &
Spoken English
Michigan State College

DATA SHEET

Name _____

Matriculation Date _____

Major (If Agriculture, what area of emphasis) _____

Degree & Date _____

Total Undergraduate Credits _____

Total Undergraduate Honor Points ____

Total Credits in Technical Agriculture
(Agr. Courses at Jr. and Sr. level) _____

Total Honor Points in Technical Agriculture _____

Basis for Honor Points (A is 4, B is 3, etc.) _____

Academic Aptitude (Psychological Examination Score) Please indicate name and form of examination & date administered, i.e. American Council on Education Psychological Examination, 1940 form, 4/21/1941 _____

_____

AMERICAN COUNCIL ON EDUCATION

Psychological Examination

For College Freshmen

Prepared by L. L. Thurstone and Thelma Gwinn Thurstone

AMERICAN COUNCIL ON EDUCATION

Psychological Examination

For College Freshmen

Prepared by L. L. Thurstone and Thelma Gwinn Thurstone

The American Council on Education

For official use in accredited colleges

744 Jackson Place, Washington, D. C.

General Instructions

This examination is different from the ordinary school examinations to which you have been accu The plan for each of these tests is as follows. First, you are given detailed *instructions* about the test, you know just what you are expected to do. Then you have some *practice problems*. Then you go tc *proper*. This is the procedure for each of the six tests in this examination. The total examination an hour.

The six tests in this examination represent a variety of tasks. Three of them involve think quantitative sort, while the other three require more linguistic ability. If you find one test hard, do no couraged. You may find the next test easier. But you should do your best on all the tests.

People differ markedly in the speed with which they can do these different tests. The tests enough to keep everyone busy for the whole time, and you are not expected to complete the tests in t allowed. By noting how many questions you can answer in a certain length of time, we can determi speed on each kind of test. You must begin to work on a test promptly when the examiner calls the time and stop immediately when he says: "Stop." Do not begin a test until the examiner gives the signal for that particular test. Do not turn back to a test after the time for it has expired. You are on each test during, and only during, the specified time as announced by the examiner in charge.

You are to record your answers on a separate answer sheet rather than on the pages of the test Instead of writing down your answers in the usual manner, you will record each answer by blackening tl between a pair of lines. *Do not make any marks or record any answers on the pages of this test booklet.*

Your answer sheet will be scored accurately if you observe carefully the following directions:

1. On the answer sheet, find the *section* which corresponds to the practice problems or test pr which you are working.
2. Then find the *row of answer spaces* which is numbered the same as the question you are an
3. Then find the *pair of dotted lines* which corresponds to the answer you choose and blacken th MISPLACED ANSWERS ARE COUNTED AS WRONG ANSWERS.
4. Indicate each answer with SOLID BLACK PENCIL MARKS drawn vertically between dotted lines. Solid black marks are made by going over each mark two or three times and by pressin on the pencil.
5. Make your marks as long as the dotted lines.
6. If you change your answer, erase your first mark completely.
7. Make no unnecessary marks in or around the dotted lines.
8. Keep your answer sheet on a hard surface while marking your answers.
9. Make no folds or creases in the answer sheets.
10. *No scratch paper* is allowed in any of these tests. The answer sheet contains a special sectio may be used for scribbling.
11. Fold the pages of your test booklet back so that *only one page is visible.* Place the test bo the left. Keep the answer sheet under the test booklet so that the answer spaces being marked are as possible to the questions being answered.

(Omit the next paragraph unless the tests are to be machine-scored.)

The examination will be scored by an electric test-scoring machine, which makes use of the fac solid black pencil mark will carry a current of electricity in the same way that a copper wire does. PENCIL MARKS MADE WITH A HARD PENCIL WILL NOT CARRY A CURRENT OF TRICITY! The machine will not give you a correct score unless you indicate your answers with soli pencil marks made with the *special* pencil which is provided. Do not use any pencil other than the spe provided. The machine cannot distinguish between intended answers and stray pencil marks. If careless in erasing, or if you leave unnecessary marks on or near the pairs of lines, such marks may be by the machine as wrong answers so that your score will be lower than it should be.

Wait until the examiner gives the starting signal for the first set of practice problems.

Arithmetic

PRACTICE PROBLEMS

In this test you will be given some problems in arithmetic. After each problem there are five answers, ıly one of them is the correct answer. You are to solve each problem and blacken the space on the answer which corresponds to the answer you think is correct. The following problem is an example.

1. How many pencils can you buy for 50 cents at the rate of 2 for 5 cents?
(a) 10 (b) 20 (c) 25 (d) 100 (e) 125

Find on the answer sheet the space labeled "ARITHMETIC, Practice Problems, Page 3." The correct ɛr to the problem is 20, which is answer (b).
In the row numbered 1, space (b) has been blackened.

In the *second* row, blacken the space which corresponds to the answer to the second practice problem.

2. If James had 4 times as much money as George, he would have $16. How much money has George?
(a) $4 (b) $8 (c) $12 (d) $16 (e) $64

You should have blackened space (a), which corresponds to $4, the correct answer.

Blacken the spaces corresponding to the answers to the following problems:

3. In 5 days Harry has saved a dollar. What has his average daily saving been?
(a) 20¢ (b) 22½¢ (c) 25¢ (d) 30¢ (e) 40¢

4. John sold 4 magazines at 5 cents each. He kept ½ the money and with the other ½ he bought papers at 2 cents each. How many did he buy?
(a) 3 (b) 4 (c) 5 (d) 6 (e) 10

When the signal is given (not yet), turn the page and work more problems of the same kind. Work y and accurately. Your rating will be the total number of correct answers. You may not be able to in the time allowed.

Stop here. Wait for the signal.

Find the correct answer to each problem below. Then blacken the corresponding space on the answer sheet.

ARITHMETIC

1. Twelve girls rented a cottage for 3 months at $40 per month. What was the total rent paid by each girl?
   (a) $3.33 (b) $9.00 (c) $10.00 (d) $12.66 (e) $120.00

2. If 3½ tons of coal cost $21, what will 7½ tons cost?
   (a) $9.80 (b) $42 (c) $45 (d) $75 (e) $98

3. A has $320, B has ¼ as much as A, and C has ½ as much as A and B together. How much have all together?
   (a) $400 (b) $480 (c) $500 (d) $520 (e) $600

4. A tank which holds 260 gallons of oil is ¼ full. How many gallons of oil are needed to fill the tank?
   (a) 65 (b) 195 (c) 200 (d) 205 (e) 220

5. A boy walked for 2¼ hours. He started at 10 minutes to 9 o'clock. When did he finish?
   (a) 10:35 (b) 11:05 (c) 11:20 (d) 11:55 (e) 12:05

6. Ray raised 60 heads of cabbage averaging 5 pounds each. He sold them at $.03 a pound. He spent $1.25 for plants and $.58 for fertilizer. What was his profit?
   (a) $6.17 (b) $6.67 (c) $7.17 (d) $7.27 (e) $7.87

7. If it takes 8 barrels of oil at $1.35 per barrel to sprinkle ½ mile of road, how much will oil cost for 5 miles?
   (a) $27 (b) $54 (c) $81 (d) $90 (e) $108

8. In a fort there are 60 men and enough food to keep the 60 men for 20 days. If 20 new men come and 40 of the first go, how many days will the food last?
   (a) 10 (b) 20 (c) 30 (d) 40 (e) 60

9. A grocer bought 160 boxes of berries. From the first 8 boxes examined he had to throw away 1 box. At this rate, how many boxes will he be able to sell?
   (a) 20 (b) 21 (c) 120 (d) 139 (e) 140

10. A U-boat makes 8 miles an hour under water and 15 miles an hour on the surface. How many hours will it take to cross a 100-mile channel, if it has to go ⅖ of the way under water?

11. Two carpenters received $150 for the work they did on a house. One worked 20 days and the other 30 days. How much more did one get than the other?
   (a) $30 (b) $35 (c) $40 (d) $45 (e) $50

12. Soldiers march 2 feet 6 inches per step and take 100 steps to the minute. How many feet do they march in 1/12 of an hour?
   (a) 1000 (b) 1250 (c) 1320 (d) 1500 (e) 1600

13. If ⅔ of a yard of silk costs $3, how many yards can be bought for $22.50?
   (a) 4 (b) 5 (c) 5½ (d) 5⅔ (e) 7½

14. John has 4 times as many marbles as James, and together they have 75 marbles. If Henry buys ⅕ of John's marbles and 33⅓ per cent of James', how many will he gain?
   (a) 10 (b) 12 (c) 15 (d) 17 (e) 23

15. The average person attends school 1,080 days. What part of a 12-year course does he complete, counting 180 days as a school year?
   (a) ⅓ (b) ½ (c) ⅝ (d) ⅔ (e) ¾

16. A fruit dealer buys 10 dozen oranges for $2.40. If two dozen spoil, at what price per dozen must he sell the good ones to gain ⅓ of the whole cost?
   (a) $.20 (b) $.25 (c) $.30 (d) $.33 (e) $.40

17. If a fowl loses ⅓ in dressing, how many pounds of undressed fowl will be necessary to dress 9 pounds?
   (a) 12 (b) 12½ (c) 13½ (d) 15 (e) 18

18. A can do a piece of work in 8 days, while B would take 20 days. After A has worked alone for 3 days, how many days will it take B to finish the work?
   (a) 8 (b) 9 (c) 10 (d) 12 (e) 12½

19. Five lamp posts are placed along a street 35 yards apart. How many yards is the first lamp post from the last?
   (a) 95 (b) 140 (c) 175 (d) 420 (e) 525

20. If ¾ of A's money equals ½ of B's money, and they have $40 together, how much has A?

Completion

PRACTICE PROBLEMS

Look at the following definition. You are to think of the word that fits the definition.

1. A contest of speed.

B F M P R

The word is *race*. The letter *R* is the first letter in the word *race*. In the section of the answer sheet ›eled "COMPLETION, Practice Problems, Page 5," the space indicated by *R* in the first row has been ackened.

Blacken the space corresponding to the first letter of the word which fits the following definition.

2. A place or building for athletic exercises.

C D G H T

The word is *gymnasium*. You should have marked the space indicated by *G* because it is the first ter in the word *gymnasium*.

Do the following examples in the same way:

3. The thin cutting part of an instrument, as of a knife or sword.

A B D H W

4. The wife of a king.

F N P Q V

5. A small or portable bed, as of canvas stretched on a frame.

C H N P T

When the starting signal is given (not yet), turn the page and work more problems of the same kind. ›rk rapidly because your rating will be the total number of correct answers. You may not be able to finish :he time allowed.

Stop here. Wait for the signal.

Think of the word that fits the definition. Then mark the first letter of that word on the answer sheet.

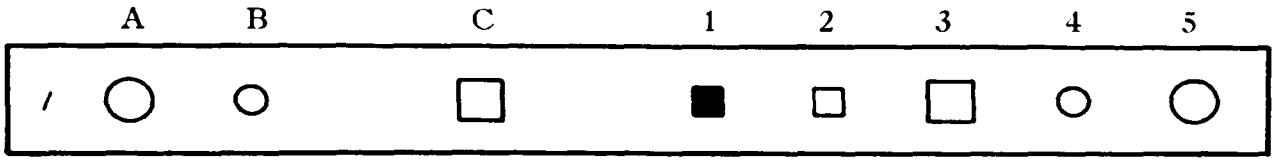
COMPLETION

1. A small elementary book for teaching children to read.
   D F K L P
2. A bride's personal outfit, as of clothes, jewelry, etc.
   E G K M T
3. Memoirs of one's life written by oneself.
   A F K S U
4. A thickly populated street marked by wretched living conditions.
   F J S U V
5. A child in the first period of life.
   G H I L M
6. One who performs daring gymnastic feats.
   A E I O U
7. One who travels to some holy place as a devotee.
   A F G N P
8. One who enters into, or offers himself for, any service of his own free will.
   D J K U V
9. The long projecting nose of a beast, as of swine.
   L R S U V
10. A lure to catch fish or other animals.
    B J K O V
11. The working room of a painter or sculptor.
    C J K P S
12. The malicious burning of property.
    A E K O U
13. Prolonged inability to obtain due sleep.
    G H I J K
14. A unit of weight for precious stones, especially diamonds and pearls.
    A C H N T
15. One without means except such as come from charity.
    A K P U Y
16. The spirit, usage, or manners of knighthood.
    A C D I N
17. A light spear for hurling.
    C F H J K
18. A specified or regular course of study.
    C M N O T
19. A small shrill flute.
    E H J M P
20. A representation of the outlines of an object filled in with some uniform color.
    G L N S W
21. Act of murdering or killing one's own brother.
    F I N P T
22. A detailed list of goods with their estimated worth.
    A D H I K
23. A very steep or overhanging place, as the face of a cliff.
    A H J P S
24. The right or act of voting in political matters.
    J N S T W
25. A point in which light rays meet after being reflected or refracted.
    E F G H J
26. A judicial writ or process requiring a party to do or forbear some act.
    A B E I Q
27. A gem carved in relief.
    C F H M T
28. A representation of some scene by the grouping of persons who remain silent and motionless in appropriate postures.
    T U V W Y
29. A kind of leather tanned or shaved so as to leave an undressed surface.
    A G S T V
30. The structural make-up of an organism or any of its parts.
    A D E J T

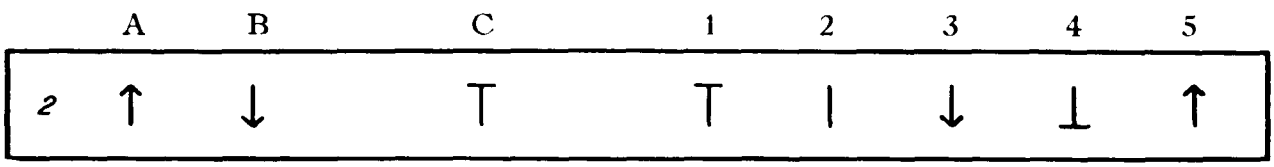
Figure Analogies

PRACTICE PROBLEMS

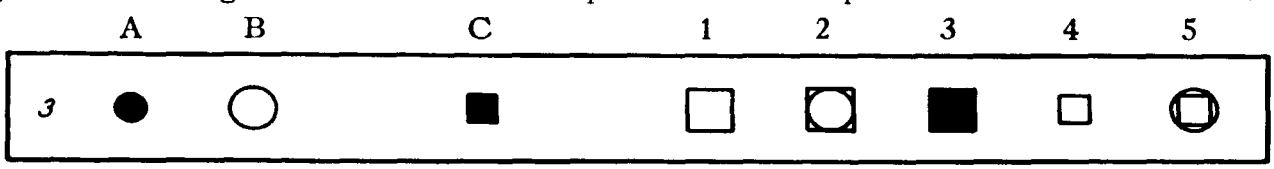
Look at the figures A, B, and C in Sample 1 below. Figure A is a large circle. Figure B is a small circle. By what rule is Figure A changed to make Figure B? The rule is "making it smaller." Now look at Figure C. It is a large square. What will it be if you change it by the same rule? It will be a small square of the same color as the large square. Figure 2 is a small white square. In the section of the answer sheet labeled "FIGURE ANALOGIES, Practice Problems, Page 7," the space numbered 2 in the first row has been blackened to indicate the correct answer.



In Sample 2 below, the rule is: "Turn Figure A upside down to make Figure B." Now look at Figure C and think how it would look when turned upside down. It would look like Figure 4. The space numbered 4 has already been blackened on the answer sheet.



In Sample 3 below, the rule has two parts: "Make Figure B of the opposite color and larger than Figure A." Apply the rule to Figure C and blacken the space which corresponds to the correct answer.

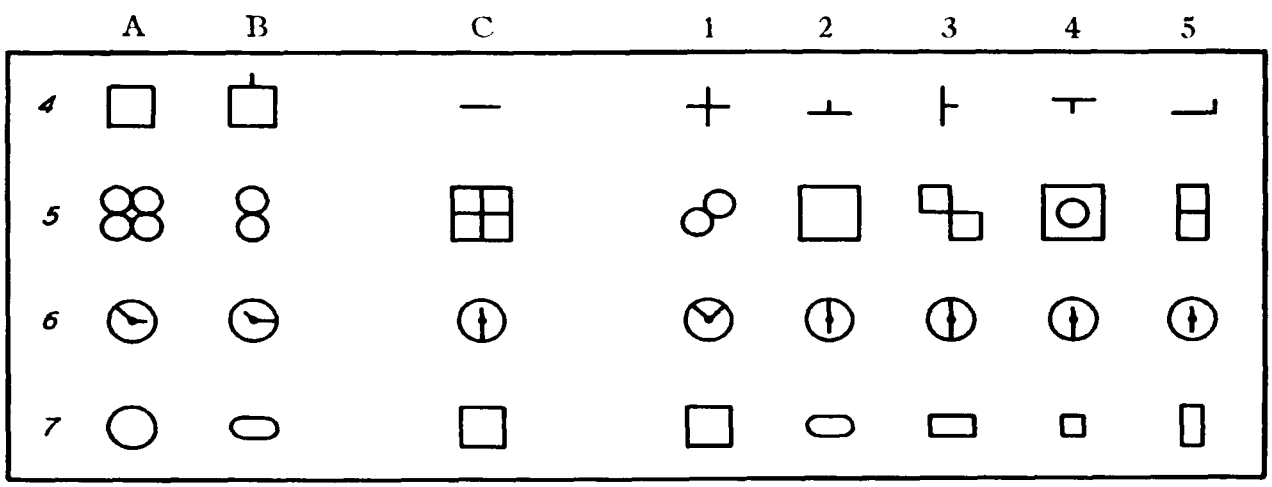


You should have blackened the space numbered 1, which corresponds to the large white square.

Notice that the rule changes from one example to another. You are to do four things to each exercise on this page and the next.

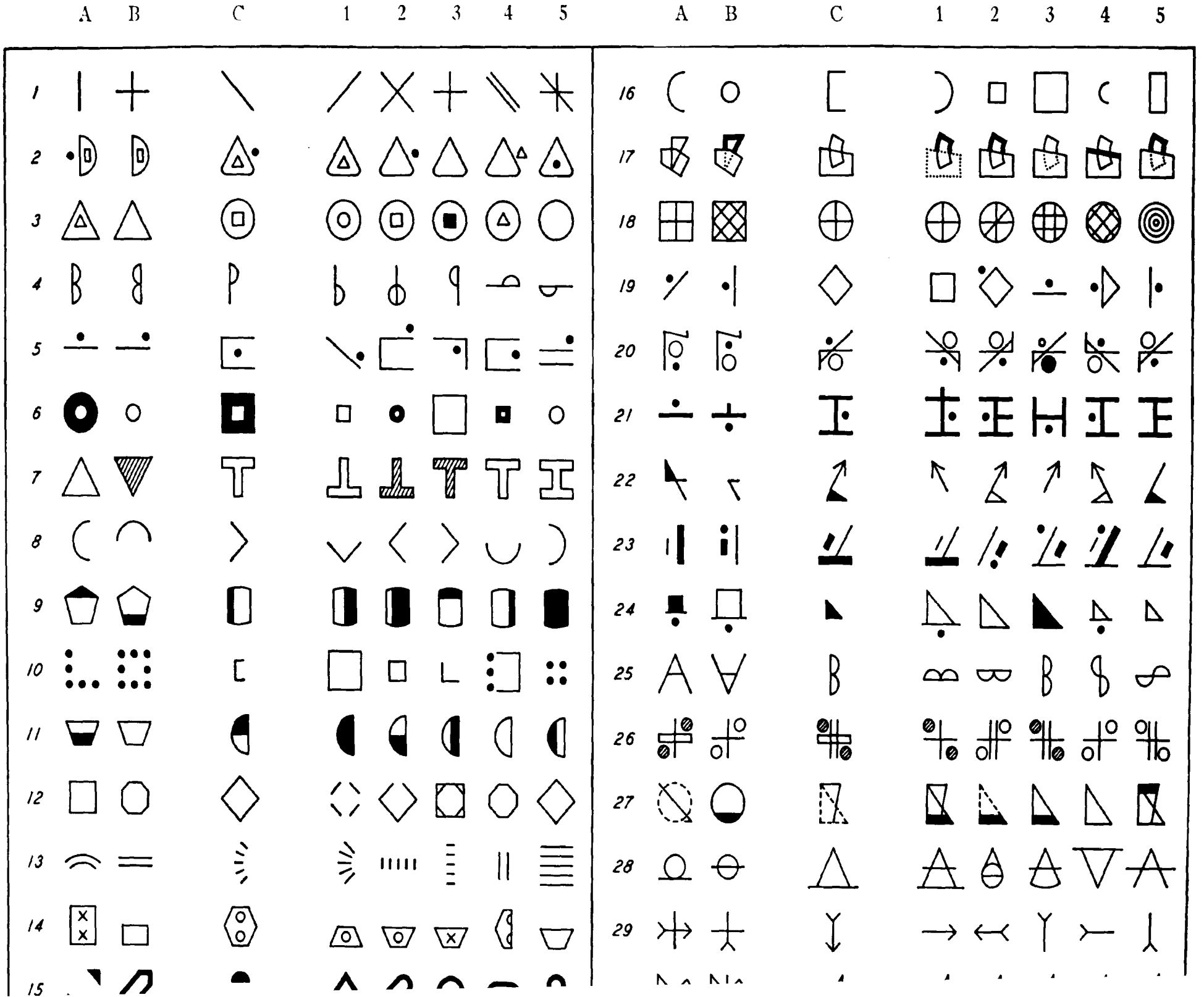
a. Decide what rule is used to change Figure A to Figure B.
b. Apply this rule to Figure C.
c. Select the resulting figure from the five figures at the right.
d. Blacken the space on the answer sheet which is numbered the same as the figure you have selected.

Proceed to the four exercises below, marking your answers on the answer sheet. Go ahead.



Stop here. Wait for the signal.

Figure 3: Select the resulting figure at the right and blacken the corresponding answer space.



Same-Opposite

PRACTICE PROBLEMS

The word at the left in the following line is "many "

1. many	(1) ill	(2) few	(3) down	(4) sour

One of the four words at the right means either the *same* as or the *opposite* of "many." The word "few," hich is numbered 2, is the opposite of "many." In the section of the answer sheet labeled "SAME-PPOSITE, Practice Problems, Page 9," space number 2 in the first row has been blackened.

The word at the left in the second example is "ancient." Select one of the four words at the right that eans the *same* as or the *opposite* of "ancient." In the second row on the answer sheet, blacken the space hich corresponds to the answer you have selected.

2. ancient	(1) dry	(2) long	(3) happy	(4) old

You should have blackened the space numbered 4, because 4 corresponds to "old," which means the .me as "ancient."

In each of the following lines select the word that means the *same* as or the *opposite* of the word at the ft. On the answer sheet, blacken the space which corresponds to the answer you have selected.

3. deep	(1) blue	(2) shallow	(3) tense	(4) watery
4. awkward	(1) clumsy	(2) loyal	(3) passive	(4) young
5. hot	(1) dry	(2) cooked	(3) red	(4) cold

When the starting signal is given (not yet), turn the page and work more problems of the same kind 'ork rapidly because your rating will be the total number of correct answers. You may not be able to finish ı the time allowed.

Stop here. Wait for the signal.

each row select the word at the right which means the *same* as or the *posite* of the first word in the row. Blacken the space which corresponds the word you have selected.

SAME–OPPOSITE

variable	(1) conquered	(2) shifting	(3) bitter	(4) sudden
barbarous	(1) tidal	(2) haughty	(3) cultured	(4) abrupt
zestful	(1) stormy	(2) tough	(3) eager	(4) lengthy
important	(1) adequate	(2) dishonest	(3) trifling	(4) open
absolute	(1) ungainly	(2) eligible	(3) gaudy	(4) partial
raw	(1) silken	(2) slick	(3) cooked	(4) stale
aqueous	(1) literal	(2) watery	(3) manual	(4) informal
sublime	(1) liberal	(2) straight	(3) exalted	(4) brisk
ethical	(1) perishable	(2) moral	(3) eloquent	(4) garish
turbulent	(1) eastern	(2) elective	(3) interested	(4) peaceful
envious	(1) spicy	(2) brainless	(3) covetous	(4) vain
fastidious	(1) musical	(2) famed	(3) negligent	(4) early
transient	(1) glib	(2) sensitive	(3) surly	(4) fleeting
inimitable	(1) matchless	(2) optical	(3) outlined	(4) parental
austere	(1) narrow	(2) stern	(3) unhappy	(4) vile
skeptical	(1) vague	(2) believing	(3) constant	(4) unwise
suave	(1) prevalent	(2) neuter	(3) old	(4) brusque
romantic	(1) facial	(2) subdued	(3) judicial	(4) prosaic
energetic	(1) apathetic	(2) balmy	(3) criminal	(4) heroic
cavernous	(1) matted	(2) smooth	(3) unsuitable	(4) hollow
seemly	(1) poetic	(2) scribbled	(3) local	(4) fit
intense	(1) likely	(2) supple	(3) vivid	(4) respectful
formidable	(1) mystic	(2) obscene	(3) menacing	(4) nodal
sinister	(1) auspicious	(2) settled	(3) diligent	(4) tacit
canonical	(1) flushed	(2) willful	(3) orthodox	(4) frozen

26. staid	(1) frivolous	(2) open	(3) tabular	(4) harsh
27. pungent	(1) sleepy	(2) bland	(3) doleful	(4) lavish
28. furtive	(1) drab	(2) rugged	(3) stealthy	(4) placid
29. cognizant	(1) next	(2) acquired	(3) unofficial	(4) unawar
30. ductile	(1) plenteous	(2) regional	(3) flexible	(4) silent
31. diffident	(1) merciless	(2) bold	(3) foaming	(4) imagina
32. immutable	(1) doubtful	(2) changing	(3) glum	(4) splendi
33. redundant	(1) poisonous	(2) peculiar	(3) active	(4) superflu
34. enigmatic	(1) dreamy	(2) puzzling	(3) faithful	(4) impish
35. devious	(1) hopeful	(2) strong	(3) deliberate	(4) indirect
36. heterogeneous	(1) lingual	(2) meager	(3) uniform	(4) organic
37. cursory	(1) naughty	(2) middle	(3) hasty	(4) mortal
38. refractory	(1) wintry	(2) obedient	(3) plain	(4) lone
39. refulgent	(1) middle	(2) sinful	(3) radiant	(4) narrow
40. finical	(1) mild	(2) nominal	(3) outlined	(4) slovenly
41. dilatory	(1) academic	(2) inward	(3) prompt	(4) credible
42. specious	(1) periodic	(2) plausible	(3) rhythmic	(4) sterile
43. desiccant	(1) drying	(2) obedient	(3) cunning	(4) frightful
44. pellucid	(1) inactive	(2) abundant	(3) gifted	(4) transpar
45. incorporeal	(1) fierce	(2) joyous	(3) grave	(4) material
46. disparate	(1) alike	(2) disparaging	(3) despairing	(4) prepared
47. optimal	(1) defensive	(2) even	(3) best	(4) variable
48. indigent	(1) special	(2) wealthy	(3) real	(4) disdainfu
49. virulent	(1) manly	(2) rotten	(3) plastic	(4) harmless
50. pusillanimous	(1) political	(2) realistic	(3) clear	(4) courageo

Number Series

PRACTICE PROBLEMS

The numbers in each series proceed according to some rule. For each series you are to find the *next* mber.

In the first series below, each number is 2 larger than the preceding number. The *next number* in the ies would be 14. Of the five answers at the right, answer (e) is, therefore, correct. In the section of the swer sheet labeled "NUMBER SERIES, Practice Problems, Page 11," space (e) in the first row has been ckened.

	Series						*Next Number*				
1.	2	4	6	8	10	12	10 (a)	11 (b)	12 (c)	13 (d)	14 (e)

Find the rule in the series below, and blacken one of the answer spaces in the second row on the answer et.

2.	20	19	18	17	16	15	10 (a)	12 (b)	14 (c)	15 (d)	16 (e)

Each number in this series is 1 less than the preceding number. You should have blackened space (c), ich corresponds to 14, the next number in the series.

Find the rule in the series below, and blacken the space on the answer sheet which corresponds to the t number.

3.	10	8	11	9	12	10	9 (a)	10 (b)	11 (c)	12 (d)	13 (e)

The series above goes by alternate steps of subtracting 2 and adding 3. You should have blackened ce (e), which corresponds to 13, the next number.

In each series below, find the rule and blacken the space on the answer sheet which corresponds to the t number. There is a different rule for each series. Go right ahead. Do not wait for any signal.

4.	8	11	14	17	20	23	10 (a)	13 (b)	23 (c)	25 (d)	26 (e)
5.	27	27	23	23	19	19	15 (a)	16 (b)	17 (c)	18 (d)	19 (e)
6.	16	17	19	20	22	23	18 (a)	20 (b)	22 (c)	24 (d)	25 (e)

When the starting signal is given (not yet), turn the page and work more problems of the same kind. rk rapidly because your rating will be the total number of correct answers. You may not be able to finish he time allowed.

Stop here. Wait for the signal.

Find the rule in each problem below and blacken the space which corresponds to the next number.

NUMBER SERIES

1.	14	18	22	26	30	34	38	39 (a)	40 (b)	41 (c)	42 (d)	43 (e)
2.	7	10	9	12	11	14	13	12 (a)	14 (b)	16 (c)	18 (d)	20 (e)
3.	17	20	23	26	29	32	35	36 (a)	37 (b)	38 (c)	39 (d)	40 (e)
4.	8	12	11	15	14	18	17	16 (a)	18 (b)	20 (c)	21 (d)	24 (e)
5.	20	18	21	17	22	16	23	9 (a)	12 (b)	15 (c)	21 (d)	24 (e)
6.	72	36	40	20	24	12	16	4 (a)	8 (b)	12 (c)	16 (d)	20 (e)
7.	8	6	4	12	10	8	16	6 (a)	10 (b)	12 (c)	14 (d)	16 (e)
8.	2	4	12	14	42	44	132	133 (a)	134 (b)	260 (c)	268 (d)	396 (e)
9.	82	73	64	55	46	37	28	14 (a)	18 (b)	19 (c)	20 (d)	27 (e)
10.	0	1	3	6	10	15	21	23 (a)	25 (b)	28 (c)	29 (d)	30 (e)
11.	4	5	6	7	5	6	7	3 (a)	6 (b)	7 (c)	8 (d)	9 (e)
12.	18	20	17	21	16	22	15	8 (a)	17 (b)	21 (c)	23 (d)	30 (e)
13.	8	9	12	13	15	16	19	17 (a)	20 (b)	21 (c)	23 (d)	24 (e)
14.	20	16	8	24	20	10	30	15 (a)	23 (b)	26 (c)	28 (d)	90 (e)
15.	7	4	12	15	5	2	6	0 (a)	1 (b)	5 (c)	6 (d)	9 (e)
16.	100	90	81	73	66	60	55	46 (a)	50 (b)	51 (c)	52 (d)	53 (e)
17.	12	6	8	16	14	7	9	7 (a)	11 (b)	12 (c)	18 (d)	36 (e)
18.	4	8	9	18	22	23	46	48 (a)	50 (b)	69 (c)	70 (d)	90 (e)
19.	40	42	21	24	8	12	3	1 (a)	4 (b)	6 (c)	7 (d)	8 (e)
20.	9	12	8	10	13	9	11	10 (a)	11 (b)	14 (c)	16 (d)	17 (e)
21.	40	33	27	21	16	11	7	1 (a)	2 (b)	3 (c)	5 (d)	7 (e)
22.	4	5	7	4	8	13	7	14 (a)	15 (b)	16 (c)	21 (d)	22 (e)
23.	44	40	42	14	10	12	4	0 (a)	2 (b)	6 (c)	7 (d)	10 (e)
24.	2	3	5	5	10	11	13	13 (a)	15 (b)	16 (c)	26 (d)	28 (e)
25.	20	2	12	60	6	16	80	2 (a)	4 (b)	6 (c)	8 (d)	100 (e)
26.	4	6	3	7	9	6	10	4 (a)	7 (b)	12 (c)	14 (d)	16 (e)
27.	10	6	24	28	7	3	12	3 (a)	6 (b)	16 (c)	24 (d)	48 (e)
28.	7	9	12	8	3	9	16	8 (a)	9 (b)	19 (c)	23 (d)	24 (e)
29.	95	92	46	42	21	16	8	2 (a)	4 (b)	6 (c)	8 (d)	10 (e)
30.	9	3	8	4	7	5	6	4	5	6	7	8

Verbal Analogies

PRACTICE PROBLEMS

Read the following words:

1. foot-shoe	hand-	(1) thumb	(2) head	(3) glove	(4) finger	(5) clasp

The first two words, *foot-shoe*, are related. The next word is *hand*. It can be combined with one of e remaining words in the row so as to make a similar pair, *hand-glove*. In the section of the answer sheet beled "VERBAL ANALOGIES, Practice Problems, Page 13," space number 3 in the first row has been ackened.

Read the following words:

2. father-son	mother-	(1) aunt	(2) sister	(3) child	(4) daughter	(5) niece

The first pair is *father-son*. The next word is *mother*. It can be combined with the word *daughter* make the similar pair, *mother-daughter*. In the second row on the answer sheet, blacken space number 4, ıich corresponds to the word *daughter*.

In each row of words, the first two words form a pair. The third word can be combined with another ɔrd to form a similar pair. Select the word which completes the second pair. On the answer sheet, blacken e space which corresponds to the word you select.

3. sky-blue	grass-	(1) ground	(2) sod	(3) path	(4) blue	(5) green
4. ice-solid	water-	(1) hard	(2) fire	(3) iron	(4) liquid	(5) boat

In the third row on the answer sheet, you should have blackened space number 5, which corresponds *green*. In the fourth row, you should have blackened space number 4, which corresponds to *liquid*.

Select the answers to the following problems and blacken the corresponding spaces on the answer sheet. ɔ right ahead. Do not wait for any signal.

5. ear-music	nose-	(1) face	(2) perfume	(3) breath	(4) tone	(5) noise
6. cloth-dye	house-	(1) shade	(2) paint	(3) brush	(4) door	(5) wood
7. green-grass	yellow-	(1) silver	(2) color	(3) golden	(4) china	(5) gold
8. cattle-hay	man-	(1) eat	(2) drink	(3) water	(4) life	(5) bread

When the starting signal is given (not yet), turn the page and work more problems of the same kind. ork rapidly because your rating will be the total number of correct answers. You may not be able to finish the time allowed.

Stop here. Wait for the signal.

n each row, select the word which completes the second pair. Blacken
ie space which corresponds to the word you have selected.

1. cow-animal	carrot-	(1) plant	(2) radishes	(3) tree	(4) fish	(5) tı
2. banker-lend	physician-	(1) illness	(2) heal	(3) kind	(4) nurse	(5) p
3. disease-filth	health-	(1) illness	(2) care	(3) safety	(4) physician	(5) sa
4. painter-picture	sculptor-	(1) artist	(2) decorator	(3) statue	(4) photograph	(5) ea
5. tree-forest	person-	(1) child	(2) couple	(3) men	(4) women	(5) cr
6. lightning-light	thunder-	(1) fear	(2) hear	(3) noise	(4) quick	(5) cy
7. try-succeed	study-	(1) teach	(2) attempt	(3) learn	(4) examine	(5) bc
8. boat-lifebelt	airplane-	(1) pilot	(2) air	(3) train	(4) mail	(5) pa
9. darkness-sunlight	stillness-	(1) moonlight	(2) air	(3) summer	(4) noise	(5) bc
0. framework-house	skeleton-	(1) ankle	(2) bone	(3) skull	(4) grace	(5) bc
1. chairman-assembly	toastmaster-	(1) speech	(2) hotel	(3) orator	(4) evening	(5) ba
2. mountain-hill	river-	(1) stream	(2) forest	(3) ocean	(4) lake	(5) co
3. wharf-steamer	station-	(1) ocean	(2) trip	(3) train	(4) car	(5) ho
4. belt-waist	collar-	(1) dog	(2) arrow	(3) soft	(4) tie	(5) ne
5. recognize-ignore	include-	(1) enemy	(2) invite	(3) omit	(4) guest	(5) be
6. breeze-cyclone	shower-	(1) sprinkle	(2) bath	(3) blood	(4) spring	(5) clo
7. team-harmony	rivals-	(1) group	(2) solo	(3) opposition	(4) prize	(5) mc
8. victory-defeat	glory-	(1) shame	(2) retreat	(3) defense	(4) death	(5) des
9. automobile-wagon	motorcycle-	(1) walking	(2) horse	(3) bus	(4) train	(5) bic
0. air-ventilation	water-	(1) navigation	(2) canal	(3) farming	(4) irrigation	(5) swi
1. mother-sister	father-	(1) boy	(2) son	(3) uncle	(4) brother	(5) nep
2. food-starvation	air-	(1) breathing	(2) suffocation	(3) ventilation	(4) capacity	(5) nou
3. chimney-house	crater-	(1) earthquake	(2) eruption	(3) lava	(4) volcano	(5) ma
4. imitate-invent	copy-	(1) art	(2) write	(3) pencil	(4) originate	(5) dra
5. banquet-snack	oration-	(1) sermon	(2) drama	(3) voice	(4) manuscript	(5) cha
6. caution-safety	risk-	(1) security	(2) danger	(3) insurance	(4) life	(5) goo
7. abundant-cheap	scarce-	(1) buy	(2) costly	(3) bargain	(4) rare	(5) pler
8. odor-fragrant	taste-	(1) sweet	(2) bitter	(3) sugar	(4) tongue	(5) sme
9. coal-weight	milk-	(1) bottle	(2) height	(3) size	(4) volume	(5) crea
0. peninsula-continent	bay-	(1) Biscay	(2) ocean	(3) port	(4) boat	(5) land
1. wheel-rim	napkin-	(1) dinner	(2) protection	(3) hem	(4) cloth	(5) mon
2. wolf-sheep	cat-	(1) fur	(2) kitten	(3) dog	(4) mouse	(5) puzz
3. war-devastation	pestilence-	(1) nuisance	(2) defeat	(3) death	(4) germs	(5) rem
4. blindness-color	deafness-	(1) hearing	(2) loud	(3) audition	(4) tone	(5) ear
5. bird-wings	fish-	(1) gills	(2) fins	(3) scales	(4) swims	(5) pon
6. platinum-lead	satin-	(1) silk	(2) dress	(3) shiny	(4) wealth	(5) ging
7. goose-pillow	calf-	(1) shoe	(2) rug	(3) curtain	(4) gander	(5) hide
8. medley-music	hash-	(1) mixture	(2) dinner	(3) chopper	(4) food	(5) beve
9. embrace-ally	assault-	(1) friend	(2) love	(3) rival	(4) country	(5) batt
0. landscape-photograph	concert-	(1) recital	(2) autograph	(3) applause	(4) record	(5) critic

AMERICAN COUNCIL ON EDUCATION

Psychological Examination

For College Freshmen

Prepared by L. L. Thurstone and Thelma Gwinn Thurstone

General Instructions

This examination is different from the ordinary school examinations to which you have been accus The plan for each of these tests is as follows. First, you are given detailed *instructions* about the test, s you know just what you are expected to do. Then you have some *practice problems*. Then you go to *proper*. This is the procedure for each of the six tests in this examination. The total examination r an hour.

The six tests in this examination represent a variety of tasks. Three of them involve thinki quantitative sort, while the other three require more linguistic ability. If you find one test hard, do not couraged. You may find the next test easier. But you should do your best on all the tests.

People differ markedly in the speed with which they can do these different tests. The tests a enough to keep everyone busy for the whole time, and you are not expected to complete the tests in t allowed. By noting how many questions you can answer in a certain length of time, we can determi speed on each kind of test. You must begin to work on a test promptly when the examiner calls the s time and stop immediately when he says: "Stop." Do not begin a test until the examiner gives the s signal for that particular test. Do not turn back to a test after the time for it has expired. You are t on each test during, and only during, the specified time as announced by the examiner in charge.

You are to record your answers on a separate answer sheet rather than on the pages of the test b Instead of writing down your answers in the usual manner, you will record each answer by blackening th between a pair of lines. *Do not make any marks or record any answers on the pages of this test booklet.*

Your answer sheet will be scored accurately if you observe carefully the following directions:

1. On the answer sheet, find the *section* which corresponds to the practice problems or test pr which you are working.
2. Then find the *row of answer spaces* which is numbered the same as the question you are ans
3. Then find the *pair of dotted lines* which corresponds to the answer you choose and blacken th MISPLACED ANSWERS ARE COUNTED AS WRONG ANSWERS.
4. Indicate each answer with SOLID BLACK PENCIL MARKS drawn vertically between t dotted lines. Solid black marks are made by going over each mark two or three times and by pressin on the pencil.
5. Make your marks as long as the dotted lines.
6. If you change your answer, erase your first mark completely.
7. Make no unnecessary marks in or around the dotted lines.
8. Keep your answer sheet on a hard surface while marking your answers.
9. Make no folds or creases in the answer sheets.
10. *No scratch paper* is allowed in any of these tests. The answer sheet contains a special sectio may be used for scribbling.
11. Fold the pages of your test booklet back so that *only one page is visible*. Place the test bo the left. Keep the answer sheet under the test booklet so that the answer spaces being marked are as possible to the questions being answered.

(Omit the next paragraph unless the tests are to be machine-scored.)

The examination will be scored by an electric test-scoring machine, which makes use of the fac solid black pencil mark will carry a current of electricity in the same way that a copper wire does. PENCIL MARKS MADE WITH A HARD PENCIL WILL NOT CARRY A CURRENT OF TRICITY! The machine will not give you a correct score unless you indicate your answers with sol pencil marks made with the *special* pencil which is provided. Do not use any pencil other than the spe provided. The machine cannot distinguish between intended answers and stray pencil marks. If careless in erasing, or if you leave unnecessary marks on or near the pairs of lines, such marks may be by the machine as wrong answers so that your score will be lower than it should be.

Wait until the examiner gives the starting signal for the first set of practice problems.

Arithmetic

PRACTICE PROBLEMS

In this test you will be given some problems in arithmetic. After each problem there are five answers, but only one of them is the correct answer. You are to solve each problem and blacken the space on the answer sheet which corresponds to the answer you think is correct. The following problem is an example.

1. How many pencils can you buy for 50 cents at the rate of 2 for 5 cents?
(a) 10 (b) 20 (c) 25 (d) 100 (e) 125

Find on the answer sheet the space labeled "ARITHMETIC, Practice Problems, Page 3." The correct answer to the problem is 20, which is answer (b).
In the row numbered 1, space (b) has been blackened.

In the *second* row, blacken the space which corresponds to the answer to the second practice problem.

2. If James had 4 times as much money as George, he would have \$16. How much money has George?
(a) \$4 (b) \$8 (c) \$12 (d) \$16 (e) \$64

You should have blackened space (a), which corresponds to \$4, the correct answer.

Blacken the spaces corresponding to the answers to the following problems:

3. In 5 days Harry has saved a dollar. What has his average daily saving been?
(a) 20¢ (b) 22½¢ (c) 25¢ (d) 30¢ (e) 40¢

4. John sold 4 magazines at 5 cents each. He kept ½ the money and with the other ½ he bought papers at 2 cents each. How many did he buy?
(a) 3 (b) 4 (c) 5 (d) 6 (e) 10

When the signal is given (not yet), turn the page and work more problems of the same kind. Work rapidly and accurately. Your rating will be the total number of correct answers. You may not be able to finish in the time allowed.

Stop here. Wait for the signal.

1943 Edition

Find the correct answer to each problem below. Then blacken the corresponding space on the answer sheet.

ARITHMETIC

1. A man earns $200 on a job requiring 8 weeks. If he works 5 days per week, what are his earnings per day?
   (a) $1 (b) $3 (c) $5 (d) $8 (e) $10

2. How many one-inch cubes can be placed in a box 4 inches wide, 6 inches long, and 2 inches deep?
   (a) 8 (b) 12 (c) 24 (d) 48 (e) 96

3. A file case has 21 drawers numbered from 1 to 21. The even-numbered drawers average 80 cards to the drawer. What is the total number of cards in the even-numbered drawers?
   (a) 800 (b) 880 (c) 960 (d) 1,000 (e) 1,680

4. I noticed that our car had gone 8 miles in 15 minutes. How many miles an hour was it going?
   (a) 16 (b) 24 (c) 32 (d) 40 (e) 48

5. A quarter ounce of gold is worth $4. How many ounces does $48 worth of gold weigh?
   (a) 2 (b) 3 (c) 4 (d) 8 (e) 16

6. The janitors in a large store use 12½ gallons of brass polish each week. How many weeks will 350 gallons of polish last?
   (a) 7 (b) 10½ (c) 11 (d) 22½ (e) 28

7. I bought 6¾ pounds of meat for $2.70. How much per pound did I pay for the meat?
   (a) $.19 (b) $.27 (c) $.33 (d) $.40 (e) $.45

8. Sound travels 1,080 feet per second. If the sound of a stroke of lightning is heard 3.5 seconds after the flash, how many feet away is the stroke?
   (a) 3,240 (b) 3,680 (c) 3,720 (d) 3,780 (e) 3,790

9. Three-fourths of a bushel of nuts is divided equally among 5 people. What fraction of a bushel does each get?
   (a) 1/5 (b) 1/10 (c) 2/15 (d) 3/20 (e) 4/15

10. If 20% of a gang of men were discharged and there were 32 men left, how many men were in the gang at first?
    (a) 40 (b) 80 (c) 100 (d) 120 (e) 160

11. How much more is ⅓ of ¾ than ¼ of ¾?
    (a) 1/16 (b) 3/16 (c) 5/16 (d) 3/8 (e) 7/8

12. A package of crackers containing 10 ounces sells for 10 cents; the same kind sells for 10 cents per pound in bulk. What is the saving on 15 pounds of crackers by buying them in bulk?
    (a) $.50 (b) $.60 (c) $.65 (d) $.90 (e) $1.20

13. One-third of an estate went to charity, and one-half of the remainder went to each of two children. If each child received $5,000, what was the value of the estate?
    (a) $10,000 (b) $15,000 (c) $17,500 (d) $20,000 (e) $25,000

14. X, Y, and Z gathered 100 chestnuts altogether. X gathered 4 more than Y, and Y gathered 6 more than Z. How many did Z gather?
    (a) 28 (b) 32 (c) 34 (d) 36 (e) 38

15. If 10% is lost by selling a bicycle for $9.00, for how much should it have been sold to gain 10%?
    (a) $9.90 (b) $10.00 (c) $10.10 (d) $11.00 (e) $12.00

16. A man owning ⅝ of a section of land sells 20% of his land. What per cent of a section has he left?
    (a) 20 (b) 37½ (c) 40 (d) 42½ (e) 50

17. If a stable has enough oats to last 10 horses 8 days, how many days will the oats last 4 horses?
    (a) 3⅓ (b) 12 (c) 16 (d) 18 (e) 20

18. If the average depth of 3 wells is 68 feet, and no one is less than 64 feet deep, what is the greatest possible depth in feet of one of the three?
    (a) 68 (b) 72 (c) 76 (d) 79 (e) 80

19. A can do a piece of work in 4 hours, and B in 6 hours. How many hours will it take them if they work together?
    (a) 2⅖ (b) 3 (c) 4 (d) 4⅗ (e) 5

20. If 9 apples are worth 6 peaches, and 4 peaches are worth 3 oranges, what per cent of an orange is worth an apple?
    (a) 25 (b) 33⅓ (c) 37½ (d) 50 (e) 66⅔

Completion

PRACTICE PROBLEMS

Look at the following definition. You are to think of the word that fits the definition.

1. A contest of speed.

B F M P R

The word is *race*. The letter *R* is the first letter in the word *race*. In the section of the answer sheet beled "COMPLETION. Practice Problems. Page 5," the space indicated by *R* in the first row has been ackened.

Blacken the space corresponding to the first letter of the word which fits the following definition.

2. A place or building for athletic exercises.

C D G H T

The word is *gymnasium*. You should have marked the space indicated by *G* because it is the first tter in the word *gymnasium*.

Do the following examples in the same way:

3. The thin cutting part of an instrument, as of a knife or sword.

A B D H W

4. The wife of a king.

F N P Q V

5. A small or portable bed, as of canvas stretched on a frame.

C G N P T

When the starting signal is given (not yet), turn the page and work more problems of the same kind. ork rapidly because your rating will be the total number of correct answers. You may not be able to finish the time allowed.

Stop here. Wait for the signal.

Think of the word that fits the definition. Then mark the first letter of that word on the answer sheet.

COMPLETION

1. A written direction for the preparation and use of a medicine.
B F H N P

2. A utensil with meshes for separating coarse particles from finer ones.
P R S V Y

3. The artificial watering of farm lands to supply growing crops with moisture.
A E I O U

4. A box or room for keeping food cool.
D H N Q R

5. The price paid or demanded for the return of a captive.
D E H L R

6. An artificial covering of hair for the head.
B D E V W

7. A choosing by vote, as to an office.
A D E G H

8. A single ring of a chain.
H I J K L

9. The latter part and close of the day and early part of darkness or night.
E F H I K

10. A newly enlisted soldier.
N O R W X

11. An enclosed sheet of ice, usually artificial, for skating.
B E N R V

12. A chair of state, especially a royal seat on a dais with a canopy.
F I L T W

13. A trench in the earth made by a plow.
A E F L P

14. A sworn statement in writing, especially one made upon oath before an authorized officer.
A F H M R

15. A short, light musical drama.
A C I O U

16. A word of opposite meaning to another.
A D H K L

17. Extortion by intimidation, especially by threats of public accusation or exposure.
B C F H K

18. A person given or kept as a pledge, as for fulfillment of a treaty.
G H I J K

19. A meeting of spiritualists to receive spirit communications.
C F G P S

20. A taillike plait of hair worn behind.
F J L O Q

21. A substance composed of two or more metals or a metal and a nonmetal.
A F L N T

22 A small bottle.
C E H V W

23. A collection of wild animals in cages for exhibition.
F K M N T

24. The rules of decorum.
E F G K N

25. A cabin on shipboard.
E H I M S

26. All work of imagination in narrative or dramatic form.
C F H I J

27. A small telescope.
S U V W Y

28. The act of talking to oneself.
R S T V Y

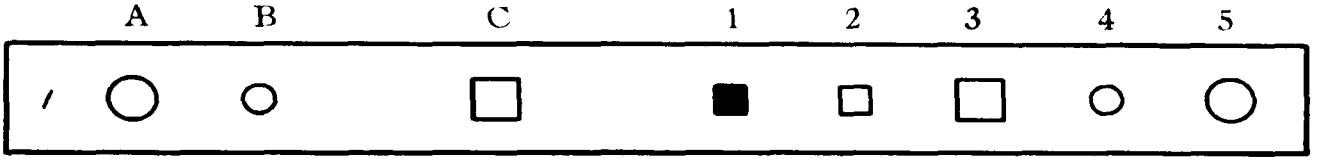
29. The husks of grain and grasses separated from the seed by threshing.
A C D E F

30. One who maliciously sets fire to a building or other property

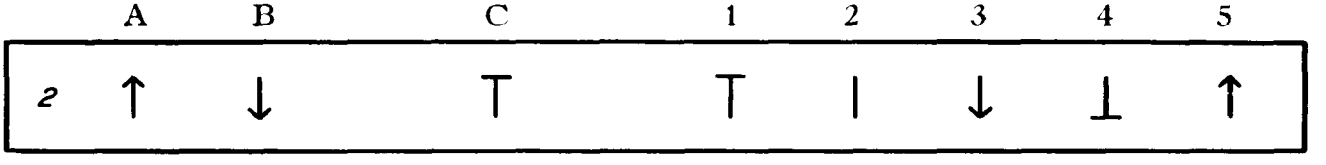
Figure Analogies

PRACTICE PROBLEMS

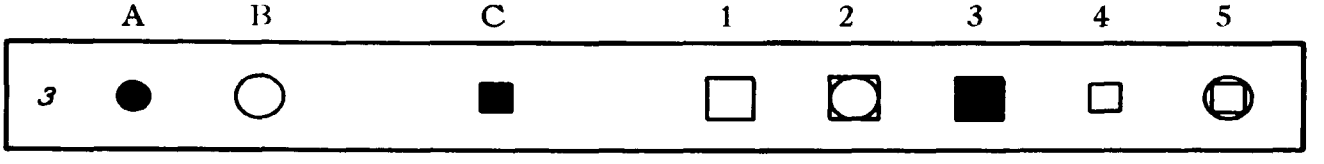
Look at the figures A, B, and C in Sample 1 below. Figure A is a large circle. Figure B is a small cle. By what rule is Figure A changed to make Figure B? The rule is "making it smaller." Now look at gure C. It is a large square. What will it be if you change it by the same rule? It will be a small square of e same color as the large square. Figure 2 is a small white square. In the section of the answer sheet labeled 'IGURE ANALOGIES, Practice Problems, Page 7," the space numbered 2 in the first row has been ackened to indicate the correct answer.



In Sample 2 below, the rule is: "Turn Figure A upside down to make Figure B." Now look at Figure and think how it would look when turned upside down. It would look like Figure 4. The space numbered 4 s already been blackened on the answer sheet.



In Sample 3 below, the rule has two parts: "Make Figure B of the opposite color and larger than Figure " Apply the rule to Figure C and blacken the space which corresponds to the correct answer.

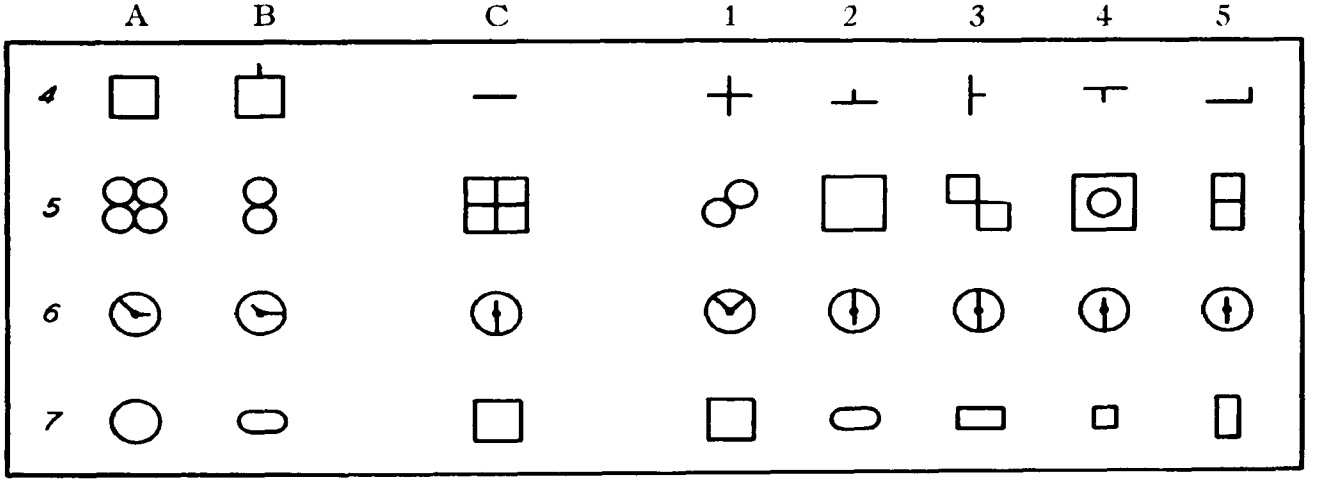


You should have blackened the space numbered 1, which corresponds to the large white square.

Notice that the rule changes from one example to another. You are to do four things to each exercise this page and the next.

a. Decide what rule is used to change Figure A to Figure B.
b. Apply this rule to Figure C.
c. Select the resulting figure from the five figures at the right.
d. Blacken the space on the answer sheet which is numbered the same as the figure you have selected.

Proceed to the four exercises below, marking your answers on the answer sheet. Go ahead.



Stop here. Wait for the signal.

In each line below, find the rule by which Figure A is changed to make Figure B. Apply the rule to Figure C. Select the resulting figure at the right and blacken the corresponding answer space.

FIGURE ANALOGIES

	A	B	C	1	2	3	4	5
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								

	A	B	C	1	2	3	4	5
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								

Same-Opposite

PRACTICE PROBLEMS

The word at the left in the following line is "many."

1. many	(1) ill	(2) few	(3) down	(4) sour

One of the four words at the right means either the *same* as or the *opposite* of "many." The word "few," h is numbered 2, is the opposite of "many." In the section of the answer sheet labeled "SAME-OSITE, Practice Problems, Page 9," space number 2 in the first row has been blackened.

The word at the left in the second example is "ancient." Select one of the four words at the right that ns the *same* as or the *opposite* of "ancient." In the second row on the answer sheet, blacken the space h corresponds to the answer you have selected.

2. ancient	(1) dry	(2) long	(3) happy	(4) old

You should have blackened the space numbered 4, because 4 corresponds to "old," which means the ə as "ancient."

In each of the following lines select the word that means the *same* as or the *opposite* of the word at the On the answer sheet, blacken the space which corresponds to the answer you have selected.

3. deep	(1) blue	(2) shallow	(3) tense	(4) watery
4. awkward	(1) clumsy	(2) loyal	(3) passive	(4) young
5. hot	(1) dry	(2) cooked	(3) red	(4) cold

When the starting signal is given (not yet), turn the page and work more problems of the same kind. ·k rapidly because your rating will be the total number of correct answers. You may not be able to finish he time allowed.

Stop here. Wait for the signal.

In each row select the word at the right which means the *same* as or the *opposite* of the first word in the row. Blacken the space which corresponds to the word you have selected.

SAME–OPPOSITE

1. severe	(1) cloudy	(2) lax	(3) flat	(4) rustic
2. healthful	(1) dreamy	(2) fierce	(3) salubrious	(4) willful
3. contemptible	(1) despicable	(2) unequal	(3) flabby	(4) incapable
4. imperative	(1) brilliant	(2) mandatory	(3) cheap	(4) honorable
5. defiant	(1) invisible	(2) indiscreet	(3) submissive	(4) periodic
6. confident	(1) restful	(2) skeptical	(3) public	(4) barren
7. sociable	(1) brisk	(2) reserved	(3) vivid	(4) erect
8. attentive	(1) fiendish	(2) fluent	(3) mindful	(4) admirable
9. despotic	(1) open	(2) comparative	(3) tyrannical	(4) brisk
10. flimsy	(1) pithy	(2) fair	(3) contrite	(4) substantial
11. petty	(1) new	(2) early	(3) ruined	(4) important
12. eerie	(1) swarthy	(2) tuberous	(3) weird	(4) jesting
13. subsequent	(1) meek	(2) preceding	(3) abated	(4) gruff
14. single	(1) hearty	(2) knowing	(3) doubtful	(4) unique
15. gaudy	(1) enraged	(2) inexact	(3) slight	(4) somber
16. gaunt	(1) haggard	(2) unhappy	(3) front	(4) dumb
17. florid	(1) pale	(2) foreign	(3) internal	(4) invisible
18. disputable	(1) certain	(2) likable	(3) prim	(4) pensive
19. garrulous	(1) present	(2) childish	(3) talkative	(4) sound
20. ignoble	(1) worthy	(2) docile	(3) stable	(4) dull
21. dogmatic	(1) stealthy	(2) urgent	(3) opinionated	(4) worthy
22. subservient	(1) later	(2) haughty	(3) dainty	(4) fragile
23. ominous	(1) needless	(2) insolent	(3) sinister	(4) constant
24. decrepit	(1) infirm	(2) tanned	(3) virtual	(4) disloyal
25. squalid	(1) forced	(2) empty	(3) grave	(4) [illegible]

26. noble	(1) base	(2) facile	(3) profuse	(4) conti
27. capricious	(1) fickle	(2) hoarse	(3) trained	(4) inbre
28. bland	(1) peculiar	(2) undue	(3) athletic	(4) brusq
29. inimical	(1) smoky	(2) mixed	(3) friendly	(4) advis
30. improvident	(1) legible	(2) mocking	(3) famed	(4) thriftl
31. perfidious	(1) eastern	(2) entire	(3) faithful	(4) liberal
32. jaded	(1) spinal	(2) tribal	(3) wide	(4) fresh
33. implacable	(1) inexorable	(2) dislocated	(3) unlearned	(4) lazy
34. urbane	(1) oral	(2) fearless	(3) noisy	(4) crude
35. imperious	(1) learned	(2) false	(3) beautiful	(4) placat
36. callow	(1) sundry	(2) sophisticated	(3) constant	(4) tall
37. circumspect	(1) fluent	(2) gigantic	(3) indiscreet	(4) hoarse
38. nonpareil	(1) threatening	(2) rhetorical	(3) peerless	(4) greedy
39. salient	(1) cowardly	(2) prominent	(3) practical	(4) loose
40. perverse	(1) comic	(2) tractable	(3) poetic	(4) first
41. exigent	(1) foaming	(2) pressing	(3) opulent	(4) average
42. gauche	(1) vital	(2) cynical	(3) clumsy	(4) double
43. vapid	(1) far	(2) insipid	(3) surly	(4) devoted
44. tenuous	(1) lateral	(2) periodic	(3) thin	(4) molar
45. recalcitrant	(1) blooming	(2) refractory	(3) lofty	(4) invisible
46. succinct	(1) clever	(2) successful	(3) verbose	(4) impromp
47. ephemeral	(1) destructive	(2) transitory	(3) green	(4) transpare
48. redolent	(1) unscrupulous	(2) odorous	(3) unruly	(4) tasteless
49. mendacious	(1) harmful	(2) truthful	(3) young	(4) reluctant

Number Series

PRACTICE PROBLEMS

The numbers in each series proceed according to some rule. For each series you are to find the *next* nber.

In the first series below, each number is 2 larger than the preceding number. The *next number* in the es would be 14. Of the five answers at the right, answer (e) is, therefore, correct. In the section of the wer sheet labeled "NUMBER SERIES, Practice Problems, Page 11," space (e) in the first row has been ckened.

	Series						*Next Number*				
1.	**2**	**4**	**6**	**8**	**10**	**12**	10 (a)	11 (b)	12 (c)	13 (d)	14 (e)

Find the rule in the series below, and blacken one of the answer spaces in the second row on the answer et.

2.	20	19	18	17	16	15	10 (a)	12 (b)	14 (c)	15 (d)	16 (e)

Each number in this series is 1 less than the preceding number. You should have blackened space (c), ch corresponds to 14, the next number in the series.

Find the rule in the series below, and blacken the space on the answer sheet which corresponds to the : number.

3.	10	8	11	9	12	10	9 (a)	10 (b)	11 (c)	12 (d)	13 (e)

The series above goes by alternate steps of subtracting 2 and adding 3. You should have blackened e (e), which corresponds to 13, the next number.

In each series below, find the rule and blacken the space on the answer sheet which corresponds to the number. There is a different rule for each series. Go right ahead. Do not wait for any signal.

4.	8	11	14	17	20	23	10 (a)	13 (b)	23 (c)	25 (d)	26 (e)
5.	27	27	23	23	19	19	15 (a)	16 (b)	17 (c)	18 (d)	19 (e)
6.	16	17	19	20	22	23	18 (a)	20 (b)	22 (c)	24 (d)	25 (e)

When the starting signal is given (not yet), turn the page and work more problems of the same kind. ς rapidly because your rating will be the total number of correct answers. You may not be able to finish e time allowed.

Stop here. Wait for the signal.

Find the rule in each problem below and blacken the space which corresponds to the next number.

NUMBER SERIES

1.	9	12	15	18	21	24	27	30 (a)	31 (b)	32 (c)	33 (d)	36 (e)
2.	2	4	8	16	32	64	128	129 (a)	160 (b)	192 (c)	232 (d)	256 (e)
3.	7	8	7	6	7	8	7	5 (a)	6 (b)	7 (c)	9 (d)	10 (e)
4.	6	9	7	10	8	11	9	7 (a)	10 (b)	12 (c)	13 (d)	14 (e)
5.	18	20	23	16	18	21	14	6 (a)	7 (b)	13 (c)	16 (d)	19 (e)
6.	24	48	12	24	6	12	3	6 (a)	12 (b)	18 (c)	24 (d)	48 (e)
7.	17	19	16	18	15	17	14	11 (a)	12 (b)	13 (c)	15 (d)	16 (e)
8.	90	82	74	66	58	50	42	32 (a)	34 (b)	36 (c)	38 (d)	40 (e)
9.	10	12	16	18	22	24	28	30 (a)	32 (b)	34 (c)	36 (d)	38 (e)
10.	8	9	12	13	16	17	20	19 (a)	20 (b)	21 (c)	22 (d)	23 (e)
11.	4	8	6	12	10	20	18	16 (a)	34 (b)	36 (c)	68 (d)	72 (e)
12.	78	76	38	36	18	16	8	3 (a)	4 (b)	5 (c)	6 (d)	7 (e)
13.	14	16	13	17	12	18	11	15 (a)	16 (b)	17 (c)	18 (d)	19 (e)
14.	50	42	35	29	24	20	17	11 (a)	12 (b)	13 (c)	14 (d)	15 (e)
15.	21	18	9	27	24	12	36	25	27	33	60	108
16.	2	5	6	5	8	9	8	4 (a)	7 (b)	9 (c)	11 (d)	12 (e)
17.	64	66	33	36	12	16	4	2 (a)	5 (b)	7 (c)	9 (d)	13 (e)
18.	20	25	30	36	42	49	56	63 (a)	64 (b)	65 (c)	66 (d)	67 (e)
19.	98	87	76	65	54	43	32	21 (a)	23 (b)	31 (c)	32 (d)	34 (e)
20.	6	8	10	8	10	12	10	8 (a)	10 (b)	12 (c)	14 (d)	16 (e)
21.	2	6	3	9	6	18	15	12 (a)	20 (b)	30 (c)	45 (d)	50 (e)
22.	6	7	5	8	9	7	10	8 (a)	9 (b)	10 (c)	11 (d)	13 (e)
23.	37	31	26	21	17	13	10	5 (a)	6 (b)	7 (c)	8 (d)	9 (e)
24.	24	27	9	18	21	7	14	11 (a)	17 (b)	22 (c)	28 (d)	33 (e)
25.	81	27	54	18	36	12	24	4 (a)	8 (b)	21 (c)	24 (d)	48 (e)
26.	41	37	38	19	15	16	8	1 (a)	2 (b)	3 (c)	4 (d)	5 (e)
27.	22	16	11	7	4	2	1	1 (a)	2 (b)	4 (c)	7 (d)	11 (e)
28.	6	12	24	16	32	64	56	28 (a)	48 (b)	56 (c)	64 (d)	112 (e)
29.	42	14	7	24	8	4	21	3 (a)	7 (b)	10 (c)	19 (d)	38 (e)
30.	5	10	13	9	18	21	17					

Verbal Analogies

PRACTICE PROBLEMS

Read the following words:

1. foot-shoe	hand-	(1) thumb	(2) head	(3) glove	(4) finger	(5) clasp

The first two words, *foot-shoe*, are related. The next word is *hand*. It can be combined with one o he remaining words in the row so as to make a similar pair, *hand-glove*. In the section of the answer shee abeled "VERBAL ANALOGIES, Practice Problems, Page 13," space number 3 in the first row has bee blackened.

Read the following words:

2. father-son	mother-	(1) aunt	(2) sister	(3) child	(4) daughter	(5) niece

The first pair is *father-son*. The next word is *mother*. It can be combined with the word *daughte* o make the similar pair, *mother-daughter*. In the second row on the answer sheet, blacken space number 4 which corresponds to the word *daughter*.

In each row of words, the first two words form a pair. The third word can be combined with anothe word to form a similar pair. Select the word which completes the second pair. On the answer sheet, blacke ne space which corresponds to the word you select.

3. sky-blue	grass-	(1) ground	(2) sod	(3) path	(4) blue	(5) green
4. ice-solid	water-	(1) hard	(2) fire	(3) iron	(4) liquid	(5) boat

In the third row on the answer sheet, you should have blackened space number 5, which corresponds o *green*. In the fourth row, you should have blackened space number 4, which corresponds to *liquid*.

Select the answers to the following problems and blacken the corresponding spaces on the answer sheet. o right ahead. Do not wait for any signal.

5. ear-music	nose-	(1) face	(2) perfume	(3) breath	(4) tone	(5) noise
6. cloth-dye	house-	(1) shade	(2) paint	(3) brush	(4) door	(5) wood
7. green-grass	yellow-	(1) silver	(2) color	(3) golden	(4) china	(5) gold
8. cattle-hay	man-	(1) eat	(2) drink	(3) water	(4) life	(5) bread

When the starting signal is given (not yet), turn the page and work more problems of the same kind. 'ork rapidly because your rating will be the total number of correct answers. You may not be able to finish the time allowed.

Stop here. Wait for the signal.

ach row, select the word which completes the second pair. Blacken
space which corresponds to the word you have selected.

VERBAL ANALOGIES

,field-fence	picture-	(1) beauty	(2) frame	(3) color	(4) art	(5)
listen-hear	look-	(1) eyes	(2) see	(3) watch	(4) ears	(5)
airplane-air	submarine-	(1) dive	(2) engine	(3) helmet	(4) ship	(5)
friend-love	enemy-	(1) companion	(2) terror	(3) defeat	(4) hate	(5)
book-author	statue-	(1) sculptor	(2) marble	(3) model	(4) magazine	(5)
tiger-hair	trout-	(1) meal	(2) water	(3) fish	(4) scales	(5)
finger-hand	toe-	(1) nail	(2) heel	(3) foot	(4) arch	(5)
skin-body	bark-	(1) dog	(2) bite	(3) tree	(4) leaf	(5)
single-double	two-	(1) eight	(2) triple	(3) one	(4) four	(5)
lion-claw	rose-	(1) pink	(2) smell	(3) plant	(4) thorn	(5)
defeat-surrender	victory-	(1) battle	(2) capture	(3) enemy	(4) emblem	(5)
Indian-wigwam	Eskimo-	(1) ice	(2) igloo	(3) home	(4) Arctic	(5)
oranges-Florida	wheat-	(1) Vermont	(2) grain	(3) California	(4) bread	(5)
face-veil	window-	(1) sash	(2) frame	(3) raise	(4) curtain	(5)
pork-pig	beef-	(1) lamb	(2) meat	(3) steer	(4) butcher	(5)
aborer-foreman	private-	(1) officer	(2) army	(3) servant	(4) soldier	(5)
lour-cake	sugar-	(1) salt	(2) candy	(3) bread	(4) lump	(5)
ourt-decision	clinic-	(1) pain	(2) physician	(3) patient	(4) relief	(5)
istorian-facts	novelist-	(1) fiction	(2) dates	(3) history	(4) writer	(5)
ommittee-chairman	team-	(1) member	(2) referee	(3) game	(4) guard	(5)
owboat-oar	airplane-	(1) engine	(2) pilot	(3) propeller	(4) cabin	(5)
pron-kitchen	coveralls-	(1) mechanic	(2) wagon	(3) overcoat	(4) garage	(5)
ow-violin	stick-	(1) violinist	(2) juggler	(3) orchestra	(4) leader	(5)
ersuade-force	suggest-	(1) censure	(2) urge	(3) hint	(4) idea	(5)
rniture-chair	tree-	(1) factory	(2) elm	(3) farming	(4) harvest	(5)
etition-demand	decline-	(1) demur	(2) refuse	(3) pause	(4) beg	(5)
ook-title	man-	(1) woman	(2) male	(3) Sir	(4) name	(5)
uality-best	quantity-	(1) more	(2) worst	(3) least	(4) many	(5)
on-ore	pearls-	(1) gems	(2) gold	(3) oysters	(4) ocean	(5)
ose-nozzle	pitcher-	(1) handle	(2) rim	(3) cover	(4) spout	(5)
ceptacle-cup	cover-	(1) lid	(2) pot	(3) container	(4) kettle	(5)
nge-door	joint-	(1) bend	(2) open	(3) arm	(4) fasten	(5)
eek-Sunday	year-	(1) months	(2) Monday	(3) day	(4) winter	(5)
loshes-shoes	shoes-	(1) boots	(2) rubbers	(3) sole	(4) laces	(5)
sease-sanitation	accident-	(1) doctor	(2) hospital	(3) bandage	(4) cleanliness	(5)
ld-ice	hot-	(1) heat	(2) steam	(3) warm	(4) melt	(5)
nnel-Collie	coop-	(1) chicken	(2) Leghorn	(3) rooster	(4) hen	(5)
nbition-initiative	discouragement-	(1) fatigue	(2) joy	(3) interest	(4) inertia	(5)
cture-paint	symphony-	(1) orchestra	(2) compose	(3) opera	(4) violin	(5)
ister-burn	bruise-	(1) blow	(2) cut	(3) bleed	(4) burst	(5)

Stop