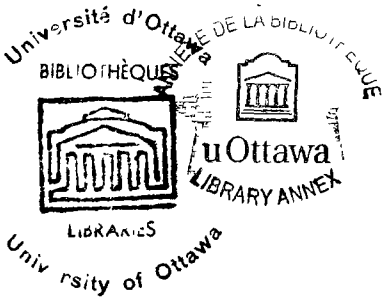
THE GUIDANCE VALUE OF VISITS TO INDUSTRY

By William Harrison Lucow, B.A., B.Ed.

Thesis presented to the Faculty of Arts of the University of Ottawa through the Institute of Psychology in fulfilment of the requirements for the degree of Master of Arts.



Ottawa, Canada, 1950

ACKNOWLEDGEMENT

This thesis was prepared under the direction of Dr. R.-H. Shevenell, O.M.I., Director of the Institute of Psychology, Faculty of Arts, University of Ottawa. For his guidance and helpful suggestions, thanks are due.

Thanks are also due to those who made the experiment possible by their kind cooperation. These include: Mr. T.A. Arnason, principal of Ralph Brown School, Winnipeg, Manitoba; Mr. J. C. Wherrett, principal of Faraday School; Mr. D. N. Ridd, vice-principal of St. John's High School; and the teachers in these schools, Miss Irene Bell, Mr. Herbert Nemish, and Mr. Frank Harder.

Thanks are also due to Canada Packers Limited, St. Boniface, Manitoba, for their hospitality and for literature from the Company library.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

INTRODUCTION

What is vocational guidance, and has it a value in the school situation?

Many teachers with long experience behind them, and doing good work with the traditional methods of teaching, ask this question as they look upon the efforts of enthusiastic novices attempting to introduce new techniques into the art of teaching. They have a right to know. Since theirs is the structure upon which the school system has been built, they should be shown the necessity and proof of worth of any new addition. This thesis will describe vocational guidance in its historical setting and then go on to give the report of an experiment that tested the worth, in one instance at least, of guidance by visits to industry.

The meaning of guidance becomes clear, not from some high-sounding definition, but from an examination of its birth and development. Its very birth has a previous history. Even in the physical world new inventions are rarely "new" in the whole sense of the word. The radio was the result of a highly developed background of electricity and magnetism: when it became possible for radio to be invented, it was invented. The same is true for talking motion pictures, for television, and for the atom bomb. The pre-natal period of vocational guidance probably dates back to the Industrial

Revolution. The division of labor to make possible mass production created a host of "vocations" where before there had been few. The growth of technology and inventions gave these vocations character and an aspect of specialization. Vocational education became necessary in order to teach the new techniques to the prospective worker. Finally, the growth and spread of the democratic ideal, the freedom to make of oneself whatever one wished, the freedom to make one's own decisions, brought in the real guidance counselor who would strive to make these decisions wise.

Frank Parsons, generally conceded as the "father" of vocational guidance, was not the first one to ponder over the problem of guiding an individual to a vocation that would employ to best advantage that individual's capacities and abilities. John W. Brewer, in his History of Vocational Guidance,[1] cites many antecedents. In 1741, a Lord Mayor of London wrote A Present for an Apprentice, which contained sound advice for those entering the world of work. Even before this, in 1575, a Spanish philosopher wrote An Examination of Men's Wits, in which he showed for what profession each one is apt, and how far he could profit in it. In 1881 Lysander Salmon Richards published Vacophy, describing a new

---

1. John W. Brewer, History of Vocational Guidance, New York, Harper, 1942, p. 57.

profession - that of enabling persons to find their right vocations. A study in sociology is Edward Bellamy's Looking Backward (issued 1887), in which he sets up a new industrial system where every man works in accordance with his natural aptitudes, and great pains are taken to discover what aptitudes he has. In 1895 George A. Merrill set into action his plan of tryouts for different vocations in a manual-training high school. In 1898, a Central Employment Bureau for Women was opened in London, and in 1904 a Future Career Association was formed there. Charles W. Eliot, president of Harvard University, read The Value During Education of the Life-Career Motive at the 1910 proceedings of the National Educational Association. These, then, and other similar attempts, constitute the pre-natal history of vocational guidance.

What Frank Parsons did for vocational guidance is what Fechner and Wundt did for psychology. Parsons was the founder of an organized vocational guidance movement. In 1894, he wrote Our Country's Need, in which he compared the care taken in training racehorses and in raising sheep and chickens with the care taken in developing the capacities of children:

> The education of a child, the choice of his employment are left largely to the ancient haphazard plan - the struggle for existence and the survival of the fittest.[2]

---

2. Ibid., p. 57.

Frank Parsons set about to evolve a plan on how to remedy this situation. His efforts culminated in the founding of a Vocation Bureau in Boston, Mass., on January 13, 1908, with himself as Director and Vocational Counselor. Parsons stated the Bureau's motto as: Light, Information, Inspiration, and Cooperation. In his first and only report[3] in May, 1908, he used the term vocational guidance for the first time, and advocated that it should be part of the public school programme.

The real meaning of vocational guidance may be best understood after a short description of what it is not. It is not a mere "getting jobs for young people", nor exactly, "distributing young people to jobs according to their ability."[4] On the other hand, guidance is not synonymous with general education. Education is a process that takes place within an individual, and teaching is a form of guidance that tries to make that process as efficient as it can be. In order to understand the meaning of guidance it must be realized that it is not the work of an employment placement bureau, nor the educative process within an individual, but that it is related to the best form of teaching - that which induces the learner to direct his own activities to profitable outcomes.

---

3. Ibid., p. 303 ff. Parsons died in 1913.

4. Arthur J. Jones, Principles of Guidance, N.Y., McGraw Hill, 1945, p. 59.

The close association between guidance and education requires differentiation to be appreciated. In education there are essentially two forces acting. On the one hand, it is the conscious effort of society to change and develop an individual so that he can fit in best to the scheme of things. On the other hand, education is the conscious effort of the individual to adjust himself to his environment. At first, in the early grades, habits and attitudes are developed that will transfer to later activities. Teaching becomes guidance when habits and attitudes have been established and the individual is directed to the environmental forces of the outside world. The adolescent is faced with a multitude of choices that will determine his future way of life. When a counselor helps him to choose wisely and well, guidance is present.

The National Vocational Guidance Association in 1937 gave this definition:

> Vocational guidance is the process of assisting the individual to choose an occupation, prepare for it, enter upon and progress in it. It is concerned primarily with helping individuals make decisions and choices involved in planning a future and building a career - decisions and choices necessary in effecting satisfactory vocational adjustment.[5]

It should be noted that the emphasis is upon the individual doing for himself certain things under competent guidance.

---

5. George E. Meyers, Principles and Techniques of Vocational Guidance, N.Y., McGraw Hill, 1941, p. 3.

Jones puts it this way:

> The purpose of guidance is to assist the individual through counsel to make wise choices, adjustments and interpretations in connection with critical situations in his life in such a way as to ensure continual growth in ability for self-direction.[6]

The work of the school in counseling, then, falls into three categories: 1° helping the pupil to secure necessary information about himself and about jobs open to him, 2° developing in him habits, techniques, attitudes, ideals, and interests, and 3° giving him direct assistance to make the choices, adjustments, and interpretations that he must make.

The report of the experiment given in this thesis takes for its field the latter part of the first category listed in the foregoing paragraph. Part of the guidance programme must be: to bring to the attention of children the jobs that will be open to them when they leave school. In choosing the industrial excursion, the experimenter limited his work to one particular field of endeavor in vocational guidance.

Of all the techniques used in a well-rounded programme of guidance, the industrial visit is perhaps the most pleasing to all concerned. Like an outdoor lesson in science, the

---

6. Jones, op. cit., frontispiece.

visit combines action, movement, observation, group conduct, and learning amidst a general atmosphere of fun. Properly managed, it can give to the guidance programme an aspect of integration and wholeness, the culmination of much clerical work behind the scenes. The pupil feels that this is the "real thing" in guidance, and the teacher should not fail to take advantage of this enthusiasm.

On the other hand, the teacher or guidance worker conducting the visit must bear in mind that an excursion is merely one among many techniques used in the programme. Erickson includes it in a "partial" list of twenty-one Instruments and Techniques of Guidance.[7] With these many techniques and practices in mind, the guidance worker will take a view of the value of the industrial visit quite different from that taken by the pupils. The teaching colleagues in the same school with the guidance worker may put the excursion down as entertainment, and not at all of value to the pupils as learning. The guidance worker would like to know himself whether the visit to industry is a valid inclusion in the list of techniques of guidance, and his teaching colleagues would like to know if it has value in the teaching situation.

---

7. Clifford E. Erickson, A Basic Text for Guidance Workers, New York, Prentice-Hall, 1947, p. 17.

Purpose of the Study

The experiment reported in this thesis was designed to show the value of the industrial visit in learning and retention of information. The method employed was used to find out whether this learning and retention could be achieved to the same extent by the traditional methods of presentation of information as by an excursion. Specifically, the experiment sought to discover whether the overt act of visitation helped to fix details of occupational data in the minds of pupils to a greater extent than if the pupils had remained at school for lectures, demonstrations of charts and photographs, discussion, but no visitation.

This introduction has pointed to the place of the industrial visit in the historical setting of vocational guidance. The question of the value of the excursion has been raised, and this value has been declared the object of investigation for this thesis. In the chapters that follow, the experiment will be described and the results reported as a basis for the conclusions reached. The opening chapter will describe the experiment and compare it with other work that has been done in the same field.

CHAPTER I

THE EXPERIMENT

The object of the experiment was to find out whether an excursion to an industrial plant by experimental groups of children would result in learning and retention significantly greater than that of control groups of children who would not make the trip. The industrial plant chosen was Canada Packers Limited, St. Boniface, Manitoba. The groups of children were taken from three schools in the City of Winnipeg: 1° Ralph Brown, an elementary school; 2° Faraday, a junior high school; and 3° St. John's, a senior high school.

The Experimental Factor

The single experimental factor in the experiment was the excursion to the Canada Packers plant made by the experimental groups. Both control and experimental groups received exactly the same instruction regarding the details of the industrial plant and the vocations involved at Canada Packers, Ltd., but only the experimental groups made the trip. In the examinations for learning and retention that followed, the experimental and control groups were again placed together and submitted to the same examinations. Thus, the actual making of the visit emerged as the only difference between the experimental and control groups.

Procedure

s e l e c t i n g a n d e q u a t i n g g r o u p s.-- One hundred sixty-two children were made available for the experiment. One hundred thirty-four were used in the experiment proper, and the remaining twenty-eight constituted a special control group to be described below. Of the 134 used, 66 from the Ralph Brown school (elementary grades V and VI) were divided into two groups of 33 each; and these two groups were designated Pair One. Thirty-six grade VIII pupils from Faraday junior high school were divided into two groups of 18 each, and these were designated Pair Two. Thirty-two grade X pupils from St. John's high school were divided into two groups of sixteen each, and these were designated Pair Three. Each pair of groups consisted of one experimental and one control group. The manner of their equating is taken up in Chapter III.

The special control group consisted of 28 children from Grades V and VI at Ralph Brown elementary school. They were equivalent to the children in the groups of Pair One. This special group was used in the experiment to determine the portion of the examination that could be answered by chance or general knowledge. The children in this group were given no instruction whatever regarding Canada Packers Limited, but they wrote the same examinations as did the experimental and control groups of the three pairs.

T e s t i n g.-- The construction of the examination was based upon the test-report suggested by Koos and Kefauver.[1] This suggested report is given in full in the Appendix. The examinations given to the groups in this experiment was of the objective type recommended by Ruch.[2] The details of the construction of the test for the experiment are given in the next chapter.

The testing programme consisted of two administrations of the same examination to all the children taking part in the experiment. The first examination took place as soon as possible after the excursion was made by the experimental groups to Canada Packers Limited. Both control and experimental groups in each pair wrote the same examination at the same time. The same examination was administered a second time about one month later to all the children. The first examination was used to measure immediate learning. The second examination was used to measure retention of information more than a month after the first examination.

From the results of the examinations, conclusions were reached regarding the value of the excursions.

---

1. L. V. Koos and G. N. Kefauver, Guidance in Secondary Schools, N. Y., Macmillan, 1932, p. 143.

2. G. M. Ruch, The Objective or New-Type Examination, N.Y., Scott, Foresman, 1929.

Some Literature on Excursions

Some experimental studies have been made on school excursions, and these are reported in Bibliography of Research Studies in Education, a publication of the United States Office of Education.

A doctor's thesis reported in this Bibliography, is by Henry C. Atyeo at Teachers College, Columbia University, and is entitled, The Excursion as a Teaching Technique (1939, 225 pp.). The report on this thesis reads:

> Studies the school excursions as practiced in foreign countries, especially in Germany; the development of the excursion procedure in the United States; and two group experiments carried out in two tenth-grade classes in the White Plains, N.Y., high school. Compares gains in factual knowledge, the specific type of knowledge acquired, and the increase in interest resulting from the use of an excursion technique in teaching units of ancient history with corresponding results of the class-discussion method, by administering tests at the beginning and end of the experiments. Points to the higher value of the excursion technique than of all other methods with which it has been compared.[3]

Another doctor's thesis, by James Anderson Frazer, also at Teachers College, is entitled, Outcomes of a Study Excursion: a Descriptive Study (1939, 84 pp.). The report on this is:

> Analyzes the outcomes of a study excursion to Tennessee and Georgia in 1938 of 20 boys and 26 girls in the senior class of the Lincoln School. Indicates that the study excursion resulted in a marked gain in information; a change in the group's attitude toward unlimited individual initiative in farming, toward private ownership of utilities, and in ability to generalize on specific items of

---

3. _____ Bibliography of Research Studies in Education, 1938-39, Federal Security Agency, U.S. Office of Education, Bulletin 1939, No. 5, p. 12.

> farm management and of power production. Shows that the study excursion provided for exercise of the ability to think critically, for adjustment in personal relations, and for vitalization of the emotional content of the work.[4]

Still another doctor's thesis on excursions is by Ella Callista Clark at Minnesota, An Experimental Evaluation of the School Excursion (1940, 231pp.):

> Shows that the pupils who took the excursion evinced greater interest in more phases of the topic and expressed a desire to carry on a greater number of voluntary activities after the unit was finished; and that pupils who had not taken the excursion expressed a desire to do so. Finds that results of the information test indicate that in units on printing, transportation, and communication, the pupils who took the excursion benefitted significantly more than did the control groups in which the excursion material was presented by other means in the classroom.[5]

Much of the literature on excursions is advisory in character, but there are to be found experimental studies with quantitative findings, such as the last one mentioned, by Ella Callista Clark. The experiment reported in the present thesis differs from Clark's in measuring retention as well as learning.

One motive for making this study was to bring additional evidence to bear upon the desirability of taking school children on excursions, notwithstanding the added effort that has to be made.

---

4. Ibid., Bulletin 1940, No. 5, p. 18.

5. Ibid., Bulletin 1941, No. 5. p. 247.

Most of the psychological and educational literature on excursions are of the informative or directional type. Much advice is given on how to conduct a tour, the preparation to make and the follow-up. One such article is entitled, "Direct Experience Through Field Studies," and offers the excursion as an antidote to formal education with its "verbalism and insulation from the real business of living."[6] The author deplores the artificial and superficial form of current education. He agrees with Dewey that "Learning through experience must be emphasized where such learning is possible."[7] He discusses scheduling, liability, problems of organization and procedure. He recommends these follow-up activities:

> Specific devices include field notes, problems, summaries, diaries, scrapbooks, booklets, reports, discussions, debates, dramatizations, construction projects, follow-up visits or interviews, independent investigations of similar kinds, exhibitions of photographs or slides made from negatives exposed on the trip, exhibitions of materials collected, maps, charts, and drawings, etc.[8]

Another article, by Alexander Frazier, entitled, "Is This School Trip Necessary?"[9] suggests a more functional use

---

6. Edgar C. Rye, Direct Experience Through Field Studies in the Bulletin of the National Association of Secondary School Principals, Vol. 31, May, 1947, 87-93, p. 87.

7. Ibid., p. 88. 8. Ibid., p. 92.

9. Alexander Frazier, Is this School Trip Necessary? in Educational Administration and Supervision, Vol. 32, March, 1946, 171-176.

of excursions. He asks:

> First then -- in what ways do schools realize that they sometimes failed in the prewar years to make the best use of excursions? What do they need to watch out for as they begin to work over their schedules for the next season?[10]

Frazier deplores 1° the collection of meaningless data that lack significance, 2° visiting plants merely because of availability -- with no policy for choosing the kind of excursion, and 3° the emphasis on etiquette rather than on making the best educational use of observation and experience. For good procedure he recommends: the collection of materials (specimens, in the case of a biology trip out of doors) or "impressions" of community data, the formation of value judgments in comparing differing conditions, and, finally, some follow-up action. He concludes:

> We might in part signify our need for setting up standards by retaining the ubiquitous wartime query to ask in the future of each proposed excursion: Is this trip necessary? If the answer is yes, let us take it; if no, let us not waste our time.[11]

Excursions are recommended by all who have studied them. Some writers warn of the growing reluctance on the part of industry and historical societies to allow visits because of poor conduct of previous classes.

---

10. Frazier, op. cit., p. 171.

11. Ibid., p. 176.

The excursion selected for the experiment in this thesis was chosen with a view to avoid the practices deplored by Frazier, mentioned in the foregoing paragraphs. Meat packing is one of the leading industries of Manitoba, and the school children learn of it in their social studies. It was fortunate indeed to secure the cooperation of the officials of the Canada Packers Limited in making possible the visits to the packing plant. As to etiquette during the visit, of course the pupils were reminded that the hospitality of the Company officials was not to be abused. But the emphasis was on observation and learning, as was evidenced by the follow-up action of administration of examinations. The project correlated with the children's school work as well as supplied the data for the experiment. There can be no hesitation in an affirmative answer to Frazier's question, Is this trip necessary?

After the cooperation of the officials of Canada Packers Limited had been secured, and the excursions sanctioned by school officials, the task ahead lay in composing an objective examination, equating the children into equivalent groups, teaching the lessons on Canada Packers Limited, making the excursions with the experimental groups, testing and retesting all the children, and interpreting the results. The construction of the examination is dealt with in the next chapter.

CHAPTER II

CONSTRUCTION OF THE EXAMINATION

The construction of the examination involved two lines of endeavor: 1° a consideration of available information regarding Canada Packers Limited in St. Boniface, Manitoba, and 2° the selection of a valid and reliable testing technique to measure the learning and retention of the information.

Sources of Information

Three sources supplied the information to be used as a basis for the examination. The first was a publication of the Company, Twenty-First Annual Report of Canada Packers, Limited,[1] which supplied figures on the fiscal standing of the Company. The second source of information was another publication, The Story of Our Products,[2] which contained all the necessary information about the products of the Company. Probably the most important source of information was the third, the reply to a questionnaire sent to the receptionist of the Company's plant. This questionnaire was the test-report

---

1. _____ Twenty-First Annual Report, Canada Packers, Ltd., as at March 31st, 1948, p. 3.

2. _____ The Story of Our Products, Kingston, Ont., The Jackson Press, Canada Packers Ltd., Feb. 1943, p. 39.

suggested by Koos and Kefauver, mentioned previously (page 3) and reproduced in the Appendix. This questionnaire was used both for obtaining information from the receptionist and for formulating the test items. Thus, the information about the Company and the construction of the examination were linked by the use of the test-report. The publications provided information that supplemented the questionnaire in the construction of the examination.

Testing Technique

In choosing the type of test to employ, the experimenter was aware of several possibilities. An oral test was not suitable as a measure of achievement. The real choice lay between the essay type and the objective examination. Because the experiment demanded exact evaluation of achievement, the essay type could not be used. There is a wealth of evidence to support the theory that the essay type examination cannot be marked with any great reliability. As far back as 1912, Starch and Elliott[3] demonstrated the unreliability of the essay type because of subjectivity in marking. Such things as bad spelling, poor handwriting, faulty composition, or teacher bias enter the evaluation in an essay-type

---

3. D. Starch and E. Elliott, The Reliability of Grading High School Work in English, in School Review, 1912, Vol. 20, pp. 442-457.

examination. Another type of test that would have served admirably is the standardized test; but, to the writer's knowledge, no standardized test exists covering the subject matter of the experiment. Only one possibility remained, that of the new-type, or objective examination.

Ruch[4] classifies objective-type examinations into no less than sixteen forms, many of them subdivided into further variations. One of these is the multiple-response or multiple-choice type of examination, and this was the type chosen in which to frame the items of the examination.

The multiple-choice test is essentially a recognition test. A statement is presented with several possible endings, and the pupil must choose among the endings for the correct one. For example, let us take one item from the completed test:

> The province from which Canada Packers does not receive raw material is
> (a) Alberta
> (b) Saskatchewan
> (c) Manitoba
> (d) Ontario

Such a test is purely objective, easy to mark, and the results lend themselves to ready computation and comparison.

---

4. Ruch, op. cit., pp. 189-190.

Lindquist says of the multiple-choice type:

> The multiple choice type is perhaps the most valuable and most generally applicable of all types of test exercises. It can be used in situations in which the simple recall types are inadequate because of the length of or the number of correct responses possible. It can be made particularly effective in requiring inferential reasoning, reasoned understanding, or sound judgment and discrimination on the part of the pupil; it is definitely superior to other types for these purposes.[5]

Many of the suggestions[6] made by Ruch regarding rules for constructing multiple-response tests were kept in mind by the experimenter in constructing the examination. The responses were chosen so that each would have some degree of plausibility. Wordings that would serve as clues were avoided. The first, second, third, and fourth responses were made correct in about equal numbers. In only one case did the correct response occur in the same position more than three consecutive times.

The experimenter was strongly tempted to use the Koos and Kefauver test-report (see Appendix) as it stood, for the examination. However, the mixed nature of the items undermined the objectivity of the test-report as an examination. The scoring would have been partly subjective and, therefore, unsuitable for the purpose at hand. Such items as, Give outstanding attractions of this occupation, or Give outstanding drawbacks of this occupation, would elicit responses peculiar

---

5. H. E. Hawkes, E. F. Lindquist, and C.R. Mann, The Construction and Use of Achievement Examinations, New York, Houghton Mifflin, 1936, pp. 135-136.

6. Ruch, op. cit., pp. 275-276.

to the individual writing the test, and the value of these responses could not be measured objectively. The great value of the test-report lay, however, in its suggesting of items for the examination.

Thus, the first question of the Koos and Kefauver test-report suggested four items for the examination. The question in the test-report read: Name and location of industry or plant. Setting this idea into items of multiple-choice, the resulting items read:

1. There is a Canada Packers Plant in:
   (a) Winnipeg
   (b) St. Boniface
   (c) Transcona

2. To get there we must take the bus at Portage Ave. and
   (a) Main St.
   (b) Gary St.
   (c) Fort St.

3. The name of the bus must contain the name
   (a) Provencher
   (b) Tache
   (c) Marion

4. The Canada Packers plant is on
   (a) Marion St.
   (b) Marion Ave.
   (c) Marion Blvd.

The guidance value of items such as these lies in making the children acquainted with the transportation system in their city. Both control and experimental groups were drilled on this information, and most succeeded in answering the items correctly. The psychology of test construction

dictates that the first items be relatively easy, and that the items increase in difficulty as the test proceeds.

The question in the test-report, Are employees chiefly men or women? suggested the item:

Of the workers at Canada Packers, there are
(a) more men
(b) more women
(c) about the same number of men and women.

Another question in the test-report asked: What proportion of the labor is skilled? Are there many young people? ..... How young? ..... Proportion .... suggested the following items:

Of the labor,
(a) less than half is skilled
(b) more than half is skilled
(c) half is skilled and half is unskilled

Of the young people,
(a) there are few
(b) there are many
(c) there are about as many as old

The youngest you may be to get a job at Canada Packers is
(a) 16
(b) 18
(c) 20
(d) 21

From what localities or countries does the raw material come? and Where is the market for the product? led to these items on the examination:

The province from which Canada Packers does not receive raw material is
(a) Alberta
(b) Saskatchewan
(c) Manitoba
(d) Ontario

The market for Canada Packers products is
(a) Canada only
(b) overseas only
(c) Canada and overseas

The total weight in pounds of Canada Packers products in 1942 was
(a) 1,000,000
(b) 100,000,000
(c) 1,000,000,000

Turning to working conditions and welfare work, the test-report called for a study of such items as wages, hours of work, vacation periods, profit-sharing plans, special training, management, lunch and rest room facilities, medical service, recreation, and pension system. These suggestions resulted in the following items:

The industry's work is
(a) all done by hand
(b) slightly mechanized
(c) highly mechanized
(d) all done by machinery

Starting wages for a girl, per hour, is
(a) 60¢
(b) 70¢
(c) 80¢

Starting wages for a boy, per hour, is
(a) 87¢
(b) 93¢
(c) $1.00
(d) $1.03

The number of hours of work per week is
(a) 40
(b) 44
(c) 48
(d) 100

The number of working days in a working week is
(a) 4
(b) 4½
(c) 5
(d) 5½

The shortest vacation is
(a) 3 days
(b) 7 days
(c) 21 days

The longest vacation is
(a) 21 days
(b) 28 days
(c) 3 months

During vacation employees receive
(a) full pay
(b) half pay
(c) no pay

The Company shares profits with the workers by
(a) raising wages
(b) giving Christmas presents
(c) giving a bonus

Most of the jobs at Canada Packers require
(a) special education
(b) special training
(c) "pull"
(d) fine personality

This requirement can be obtained
(a) on the job
(b) at school
(c) at university

The part employees take in management is
(a) very much
(b) very little
(c) none at all

A nurse is in attendance
(a) every morning
(b) every afternoon
(c) every morning and every afternoon

A doctor is in attendance
(a) every morning
(b) every afternoon
(c) every morning and every afternoon

In vocational guidance it is well that the children guided should know something of the extent and scope of the industry in which they may seek employment. There is a feeling

of pride in belonging to a "big" company. Accordingly, items were included covering the fiscal standing of the Company as revealed in their Twenty-First Annual Report. The summary on page 3 of that report suggested these items:

In 1947-48 sales amounted to
(a) $1,000,000,000
(b) $200,000,000
(c) $10,000,000

In 1947-48 the total weight in pounds of goods produced was
(a) over a billion
(b) less than a billion but more than a million
(c) about one million

The profit per pound was
(a) 1/7¢
(b) 2¢
(c) 1¢

For items concerning the working operations in the plant and the products produced, the experimenter turned to the other publication of the Company, The Story of Our Products. This completed the sources of information, and the remaining items for the examination were composed from the material in this publication:

In the slaughtering room one of the things they do is
(a) grinding
(b) shackling
(c) packaging

One of Canada Packers products is
(a) Domestic Shortening
(b) Mazola Oil
(c) Swift's Lard

Weiners are cooked in
(a) special wax paper
(b) cellophane
(c) animal skin

Pharmaceuticals means
(a) medicines
(b) farmers' tools
(c) food for farmers' hogs

In soap-making, the main ingredient is
(a) wood ashes
(b) acids
(c) fats

Salt is added in the soap-making process to separate out
(a) the glycerine
(b) the saponifier
(c) the tallow

The test was duplicated by hectograph, its thirty-five multiple-choice questions appearing on two sheets of paper stapled together. As the examination was intended for repeated use, the pupils were cautioned not to write on the question papers; they were to put their replies on a test answer slip which was supplied to each of them. The final examination together with the test answer slip and key are given in the Appendix.

The Validity and Reliability of the Examination

The most essential characteristic of a good achievement examination is that it tests for the acquisition of learning for which the course of study is designed. This characteristic is called <u>validity</u>, and has generally been defined as "the

degree to which a test or examination measures what it is intended to measure."[7] More specifically:

> If a test is valid, it is valid for a given purpose, with a given group of pupils, and it is valid only to the degree that it accomplishes that specific purpose for that specific group.[8]

Or, again from Ruch:

> 1. Validity refers to the care taken to incorporate in a test or examination those elements or items which are of prime importance, and to the pains taken to eliminate the non-essential.
>
> 2. Validity is in general the degree to which a test parallels the curriculum and good teaching practice.[9]

Since validity is the most important single feature of an examination, great care was exercised in making the examination in the experiment as valid as possible.

In the first place, the test-report from which the test items of the examination were constructed had a validity of its own in being the composition of competent workers in the field. Koos and Kefauver rate high in the vocational guidance field; their books may be found in almost any psychological or educational library. While not all the items of the examination were composed directly from their suggested test-report, the items taken from the information in the Company's publications were patterned after those found in the Koos and Kefauver test-report.

Secondly, the judgment of competent persons was secured before the items of the examination were included in

---

9. Ruch, op. cit., p. 28.

their final form. At least two principals, three teachers, and the receptionist at Canada Packers Limited, read and passed judgment on each item. As a result, several items were re-examined and re-worded before they were included in their final form in the examination.

Another factor that contributed to the validity of the examination was the fact that it was composed before the lessons on Canada Packers were taught. This ensured a close relation between the items of the examination and the lesson material. In fact, care was taken in teaching the lessons to mention the answers to all test items at least twice, without, of course, bringing to the attention of the children that these were the items to be used in the examination. The guiding principle in validation is that the test must parallel the actual teaching; or, in other words, the examination must represent an extensive sampling of the materials of instruction. The manner of correlating the examination with the teaching in this experiment was designed to follow this principle.

The arrangement of items also adds to the validity of a test. By placing the easiest items first and the most difficult last, this additional validity was achieved. First items in the test dealt with directions for reaching the plant, and these were considerably easier for the children to answer than were the last ones concerning the manufacturing of the Company's products.

R e l i a b i l i t y.-- Second in importance to validity is the reliability of a test. By this is meant the degree of consistency to which a test measures what it measures. Thus, if a thermometer were to register, in successive testings, the same boiling point for pure water under constant conditions of atmospheric pressure, that thermometer would be considered reliable. In the same way, a test is relaible if it would yield the same score on successive administrations, with no great time interval between testings. (The human mind is not as stable as water.) One way to secure reliability is to have objectivity in scoring. The reason for not using the Koos and Kefauver test-report as it stood for the examination was that the test-report was not sufficiently objective. By re-phrasing the items into the multiple-choice variety the examination was made completely objective, and the scoring could not help but be uniform. This objectivity and uniformity of scoring contributed to the reliability of the examination.

This chapter has outlined in detail the steps taken in the construction of the examination, and has set out the procedures whereby the examination was rendered valid and reliable. The experiment was to proceed with the teaching of lessons built around the items in the examination. Before

this could be done, however, the groups had to be selected and equated on the basis of mental ability. The selection and equating of the groups will be dealt with in the next chapter.

CHAPTER III

THE SELECTION AND EQUATING OF GROUPS

It is often impossible to achieve the ideal in anything. Even to approach the ideal in an educational experiment of this kind, where it was necessary to disrupt classes in three different schools, would have been impossible. The experimenter had to do his best with the groups supplied and the time allotted.

The ideal in group selection may be found in an article by S. A. Courtis, of the University of Michigan. Its title is, "Criteria for Determining Equality of Groups."

> A. Give a series of tests, separated by intervals sufficient to permit real growth in all subjects. At least three such tests should be given.
>
> B. Match pairs on achievement in Test 2 and growth from Test 2 to Test 3.
>
> C. Predict the scores that will be made on Test 4 in both groups. Deviations of actual scores from predictions measure the validity of the matching. Compare groups by distributions of individual growths. If predictions and scores do not agree, rematch the two groups, and again predict.
>
> D. As soon as the groups are proved equal by criterion C, introduce the experimental factor into the experimental group. Predict growth of control group.
>
> ...I personally believe a fifth criterion essential. All scores should be made comparable by being expressed in maturation units before matching and tabulations. Under

> such conditions, scores would be truly comparable, intercorrelations would arise, and prophesy could be based upon the results with assurance.[1]

To apply criterion A to the experiment would have meant interruption of classes beyond what could reasonably be asked of school authorities. Without A -- B and C could not be applied. Another method of equating the groups had to be used, and this could be followed by criterion D.

H. E. Garrett, in his Statistics in Psychology and Education, provides a formula for experiments similar to this, when groups are not matched subject for subject in initial performance. He writes:

> The method of "equivalent groups" has been employed in a variety of psychological and educational studies. Well known illustrations are found in experiments designed to evaluate the relative merits of two methods of teaching; to determine the effects of drugs, e.g., tobacco or caffeine, upon efficiency; to investigate the transfer effects of special training, and many other factors. When groups are not matched subject for subject in initial performance, but are simply equated as to mean and σ by a random selection of fairly large samples, it is impossible to calculate the correlation between final scores. Formula $(37)^2$ is then usually employed although it gives results which may be subject to considerable error.[3]

---

1. S.A. Courtis, Criteria for Determining Equality of Groups, in School and Society, Vol. XXXV, June 25, 1932, No. 913, pp. 874-878.

2. $\sigma_D = \sqrt{\sigma_{M_1}^2 + \sigma_{M_2}^2}$

3. H. E. Garrett, Statistics in Psychology and Education, 1946, Longmans, Green and Co., Toronto, p. 221.

The writer is aware of the limitation of statistical measurements in claiming that the groups were truly matched. In the last analysis, philosophical or critical reflective thinking will have to be the determining factor; for no mathematical computation will ever match human groups exactly. Good, Barr, and Scates take something of this view in their The Methodology of Educational Research:

> It has been emphasized especially that indiscriminate use of the control-group technique impedes real progress in education due to the fact that: (1) invalid results become perpetuated in the literature where they influence the uncritical reader, and (2) the methodology of research may suffer through over-standardization of the control group method. Suggestions for safeguarding this type of experimentation are as follows:
>
> 1. Exercise care in organizing the investigation so as to give the control group a fair chance so far as the experimental factor is concerned.
>
> 2. Be certain that the type of training given the experimental and control groups constitutes an important factor experimentally.
>
> 3. Note various types of change and improvement which take place in the control group during the experimental period.
>
> 4. Examine critically the function and place of standard tests in the measurement of results.
>
> 5. Make the measurement complete and comprehensive.
>
> 6. Use sagacity and insight in the interpretation of measures.[4]

---

4. W. A. Brownell, "Some Neglected Safeguards in Control-Group Experimentation," Journal of Educational Research, XXVII (October, 1933), pp. 98-107, quoted by Good, Barr, and Scates, The Methodology of Educational Research, 1941, N.Y., Appleton Century, p. 494.

Each pair of groups used in this experiment was rather well matched even before the various criteria could be employed. To begin with, each pair of groups was taken from a homogeneous mass. Two of the pairs of groups were all boys in the same grade in the same school. They had the same teachers and were generally under the same environmental influences. The same could be said of the third pair of groups, except that they consisted of both boys and girls.

With one pair of groups the equating of the pupils was made on the basis of general intelligence. With the second pair the basis was achievement as shown in class standings. With the third the basis was percentile ratings in L, Q, and T scores. This did not arise out of the experimenter's love for variety: he had to use what was available. With its variety and imperfections, the attempt at equating the groups was certainly better than arbitrary division; and, taking into consideration the homogeneous nature of the groups to begin with, for purposes of the experiment the pairs of groups were matched as well as possible under the circumstances.

Three pairs of groups were used in the experiment, together with a single group referred to as the Special Control Group. Each pair consisted of one control and one experimental group. A short description of each of these seven groups follows.

P a i r O n e.-- Sixty-six boys from grades V and VI in Ralph Brown School, Winnipeg, were separated into two groups of thirty-three each. Their ages and I.Q.'s were obtained from medical cards found in the school files. The separation into two groups was based on I.Q.'s. The sixty-six boys were arranged in order of I.Q., and alternately placed into two groups. Means, medians, and sigmas were computed for each group to see if they were the same. At first they were not; so changes were made by transferring and exchanging some in the first group with some in the second. Finally, the matching was exactly the same. Some slight alteration occurred at the last minute, however, due to the inability of two boys in the experimental group to make the trip. These were exchanged with two boys from the control group, and this exchange accounts for the slight difference in matching. (See Table II, p. 29.)

P a i r T w o.-- Thirty-six boys from Grade VIII in Faraday School, Winnipeg, were separated into two groups, 18 in the control, and 18 in the experimental. Their ages and achievement were obtained from school records. This achievement was converted into percentile ranks in order to serve as a basis for division.

P a i r T h r e e.-- Thirty-two boys and girls from Grade X in St. John's High School, Winnipeg, were separated into two groups of 16 each. Their ages and percentile

in ability were obtained from school records, and this intelligence rating was used as the basis for equating.

T h e S p e c i a l C o n t r o l G r o u p.-- Twenty-eight girls from grades V and VI in the same room at Ralph Brown School, Winnipeg, constituted the Special Control Group. They were in the same age and ability category as the boys in the groups of Pair One. No division into equivalent groups was necessary here, as these girls served a special purpose which will be discussed in a separate chapter.

The method of equating groups based on ability and achievement used in this paper may be far from the ideal as set out by Courtis, but it is not without support from other authorities. Max D. Engelhart, of the University of Illinois, wrote in the Journal of Educational Research:

> The use of ordinary school classes, whose degree of equivalence is later checked, is to be commended since it causes little change in the usual schoolroom conditions. That groups should be equivalent with respect to measures of general intelligence has become rather well accepted among research workers in education.[5]

Tables II and III on the next page show the summary of statistics of ages and abilities of the three pairs of groups. Primary data appears in the Appendix.

---

5. Max D. Engelhart, Techniques used in Securing Equivalent Groups, in Journal of Educational Research, Vol. XXII, No. 2, Sept. 1930, p. 139.

TABLE I.

AGE IN MONTHS OF GROUPS

PAIR	GROUP	RANGE	MEAN	MEDIAN	SIGMA
One	Control	48	141.27	139.00	11.26
One	Experimental	42	141.45	138.88	9.81
Two	Control	54	170.33	165.75	12.43
Two	Experimental	44	171.17	170.50	9.30
Three	Control	31	190.82	191.25	7.31
Three	Experimental	57	194.62	192.50	12.45

TABLE II.

MENTAL ABILITY OF GROUPS

PAIR	GROUP	UNIT	RANGE	MEAN	MEDIAN	SIGMA
One	Control	I.Q.	51	105.72	103.80	13.23
One	Experimental	I.Q.	51	104.72	103.80	13.32
Two	Control	P.R.	90	47.28	49.50	28.25
Two	Experimental	P.R.	92.5	49.50	49.50	29.11
Three	Control	P.R.	83	60.75	59.50	23.48
Three	Experimental	P.R.	97	66.06	69.50	26.82

In Table II the range indicates the spread in ages from the youngest to the oldest in each group. The mean, or average age for each group, shows about 10 months difference in Pair One, one month difference in Pair Two, and four months difference in Pair Three. The median age differs from the mean age in being the age of the middlemost pupil when the pupils are arranged according to age, from the youngest to the oldest. Thus for Pair One, the difference in median age is eight months, for Pair Two five months, and for Pair Three one and one-quater months. Sigma is a measure of dispersion about the mean. Thus in Pair One, the Control Group sigma (standard deviation) of 11.26 indicates that roughly 2/3 of all ages for this group lie between 130.01 months and 152.53 months.

Table III is similarly interpreted, but it will be noted that the matching is much closer. This is because the groups were primarily equated on the basis of mental ability, while the matching for age was incidental.

With the pairs matched as well as possible, the next step was to proceed with the action. The method of conducting the experiment, together with the results observed, will be presented in the next chapter.

CHAPTER IV

METHOD AND OBSERVATIONS

With the preliminary arrangements for the excursion completed, and the groups selected and equated, the experiment was ready for procedure. This procedure consisted of four steps: 1° teaching all the control and experimental groups the same lesson about Canada Packers, 2° taking the experimental groups only on the excursion to the Canada Packers plant in St. Boniface, 3° testing both groups with the same examination the day following the excursion, and 4° re-testing all groups with the same examination more than a month later.

In addition, testing was done on the Special Control Group, an account of which will be given in the next chapter.

The Lesson

In introducing the topic, no mention was made of the nature of the experiment. Instead, the instructor tried to develop a congenial spirit in the class in order to lessen disappointment over the fact that only half would be allowed to make the trip. The excuse given was that sixty-six boys would be too many to handle, and that they would have to go in shifts, the first immediately, and the second perhaps not for two months. (The experiment had to be completed before

before the control groups could be allowed to visit the plant.) Contributing to the attempted production of a congenial spirit were: 1° the information that Canada Packers would treat the visitors to doughnuts and drinks after the visit, 2° the promise by the instructor to photograph the one in each group that obtained the highest score in the examinations, and 3° the injection to the experimental groups: "Don't get lost in the killing room -- we shouldn't want to contaminate the pigs!"

Instruction was given on how to reach the Canada Packers plant by bus starting from each school concerned. All details required for answering the transportation items in the test were mentioned at least twice. There followed a discussion of the personnel employed at the plant. This included consideration of age, sex, nature of labor (skilled and unskilled), wages, working time, vacations, bonus, part in management, medical services, and comforts. Again, information required for test items were mentioned at least twice.

Very careful and precise information was given regarding the fiscal standing of the Company. Care was exercised in making sure that the pupils could distinguish between the large numbers involved.

Concluding the lesson, the instructor dwelt upon the departments at the plant. Products and markets were discussed, with special attention given to pharmaceuticals,

the killing room, and the making of soap. Many of the facts required for test items were mentioned a third time in the summary of the lesson.

The Excursion

The experimental groups from the three schools were escorted by the experimenter on separate days to Canada Packers, St. Boniface, along the route mentioned in the lesson. Everything went as planned, the pupils being shown through the plant in groups of ten by guides supplied by the Company. At the conclusion of the tour, the pupils were treated to doughnuts and drinks as promised. The groups returned to their schools via the same route they had come.

Throughout the excursions the experimenter was careful to add no word of instruction to the experimental groups. The purpose of his silence was to maintain the purity of the experimental factor -- that of making the excursion. The examinations were administered during the first morning following the trips; so the groups had little opportunity to exchange information by conversation. Even if they had done so, the control groups could not gain information they had not already received in the lesson.

The First Examination

On the first morning following the trips, all groups were tested with the same examination. (See Appendix.) A

summary of the statistics of this examination is on page 35; primary data appear in the Appendix. (Results for the Special Control Group will be found in Chapter V.)

The Second Examination

The second examination of Pair One took place January 21st, 1940, and the other pairs of groups a few weeks later. Exactly like the first examination, it was given to determine whether there was a significant difference in retention for the control and experimental groups.

Table III presents a summary of the statistics of the results of the examinations. For the first test, every experimental group scored better than the corresponding control group. For Pair One the difference is not so marked as for the other pairs; especially when one takes into account the sigmas (standard deviations). The interpretation for Pair One, Test 1, is that roughly two-thirds of the control group scored between 19.[illegible] and 25.[illegible]; and two-thirds of the experimental group scored between [illegible].43 and 27.43. For Pair Two in the same test, two-thirds of the control group scored between 21.99 and [illegible].33, while two-thirds of the experimental group scored between 23.[illegible] and 31.[illegible]. For Pair Three in the same test, two-thirds of the control group scored between 24.62 and 31.59, while two-thirds of the experimental group scored between 26.82 and 32.56.

In Test 2 the experimental groups did better than the control groups except for the high school groups in Pair Three, where the control group scored 0.38 of a point higher than the experimental. For Pair One, two-thirds of the control group scored between 17.79 and 26.18; while the experimental group had a spread of from 19.93 to 25.77 for its middle two-thirds. For Pair Two, two-thirds of the control group scored from 19.27 to 26.51; while two-thirds of the experimental group scored from 21.19 to 27.90. For Pair Three, two-thirds of the control group scored between 24.57 and 32.19, while two-thirds of the experimental group scored from 24.82 to 31.18.

TABLE III.

Means and Standard Deviations of Scores for the Two Administrations of the Examination

PAIR	GROUP	N	MEAN Test 1	SIGMA Test 1	MEAN Test 2	SIGMA Test 2
One	Control	33	23.48	3.49	21.94	4.24
One	Experimental	33	23.94	3.54	22.85	2.92
Two	Control	18	25.17	4.06	22.89	3.62
Two	Experimental	18	27.50	3.70	24.50	3.40
Three	Control	16	28.06	3.44	28.38	3.81
Three	Experimental	16	29.69	2.87	28.00	3.18

The fact that many pupils scored higher on the second administration of the same examination, given more than a

month after the first, calls for an explanation before conclusions for the whole experiment can be reached. This phenomenon was strongly manifested in the Special Control Group, which will be dealt with in the next chapter.

CHAPTER V

THE SPECIAL CONTROL GROUP AND THE PHENOMENON OF REMINISCENCE

> Reminiscence is defined in this paper as the improvement in the recall of incompletely learned material after an interval of time without intervenient formal relearning or review.[1]

The Special Control Group may be considered equal and parallel to the control and experimental groups of Pair One, except that it consisted of girls instead of boys. They were of the same age and grade grouping in the same school, and were subject to the same environmental influences.

The purpose of the use of the Special Control Group in the experiment was to determine how much of the test could be answered by general knowledge and the operation of chance. Accordingly, this special group was tested with the same examination and at the same time as the groups in Pair One, but with no previous instruction or warning.

The results of the tests on the Special Control Group (summary on page 38 and primary data in Appendix) showed: 1° less than half the items were answered correctly on the first test, and 2° scores were significantly improved on the second test.

---

1. Grace O. McGeoch, The Conditions of Reminiscence, in American Journal of Psychology, 1935, 47, 65-89, p. 65.

The writer submits that the increase in scores on the second testing was due to the phenomenon of reminiscence. It is true that the children of all groups could have, and probably did, exchange information about the examination in the intervening time between tests. This, however, does not exclude the result as being due to reminiscence. According to McGeoch's definition, "formal relearning or review" is absent in reminiscence. The voluntary exchange of information among the groups because of interest cannot be classed as formal. This is exactly the stand taken by a Chicago man, Williams, who also investigated the phenomenon of reminiscence and " doubted whether reminiscence meant anything more significant than voluntary and involuntary rehearsal of the material during the interval between test and retest."[2]

Because the Special Control Group had no instruction or warning, their results may be considered as showing the purest reminiscence. Let us consider the following table.

TABLE IV.

Analysis of statistics of the Special Control Group

	TEST 1	TEST 2	DIFFERENCE	SIGNIFICANCE RATIO
Mean	13.89	15.79	1.90	2.30
Sigma	2.82	3.27		

2. R. S. Woodworth, Experimental Psychology, N.Y., Holt, 1938, p. 64.

With a significance ratio of 7.3 we are almost certain that the difference in mean scores for Test 1 and Test 2 by the Special Control Group is a true difference, and not attributable to chance. Somehow, the original impression made by the first test upon the minds of the children in the special group grew to greater proportion by the time they wrote the test the second time. In psychological terms, the trace was consolidated to favour retention. Let us define these terms.

> In learning, work is done by the organism; this work leaves after-effects which we may include under the noncommittal term, trace. What is retained is this trace. The trace is a modification of the organism which is not directly observed but is inferred from the facts of recall and recognition.[3]

"Consolidation" in psychology is used in the same sense as in ordinary language. When referred to the trace it implies a deepening which will favour retention of the learning. Reminiscence implies a consolidation of the trace "without intervenient formal relearning or review." This is the sense in which it is claimed that the Special Control Group displayed the phenomenon of reminiscence.

Reminiscence may be considered the advanced stage of a scale consisting of forgetting, retention, and reminiscence. Woodworth cites Ballard in defining reminiscence as a process opposite to forgetting.[4] Ballard had worked with school

---

3. Ibid., p. 6.

4. Ibid., p. 64.

children of about 12 years of age (similar to the boys in Pair One and the girls in the Special Control Group) who, after partial learning of a poem, showed a higher score in reproduction after two days than immediately after learning. In the experiment reported in this thesis, partial learning of the facts about Canada Packers was effected by the writing, without previous warning, of the first test by the Special Control Group. When this group wrote the test again more than a month later, the mean score was significantly higher. If, as Ballard writes, reminiscence is the opposite of forgetting, then the Special Control Group displayed that phenomenon. (Incidentally, this concept of reminiscence points to a definite value in giving examinations to school children. Those who would abolish examinations altogether overlook the educational value of the examinations themselves.)

According to one writer, girls exhibit a greater degree of reminiscence than boys.[5] This might be a criticism of using only girls in the Special Control Group; but McGeoch rejects the hypothesis that age and sex make any difference in reminiscence. She asserts that reminiscence is related to inhibition, perseveration, superiority of distributed practice in learning, to recovery of conditioned responses during an interval of inactivity following experimental extinction, and

---

5. Osborne Williams, A Study of the Phenomenon of Reminiscence, in Journal of Experimental Psychology, No. 3, 1926, (pp. 368-387), p. 384.

to retention of incompleted tasks. This last may have been the key to the presence of reminiscence in the Special Control Group. After writing the first test the children in this group must have felt the task incomplete, and this may have precipitated the reminiscence that resulted in better scores in the second test.

It is reasonable to suppose that, if reminiscence was present in the Special Control Group, it was also present in every one of the other groups. Indeed, there were students in every group that scored higher in the second test than in the first. The high school control group (in Fair Three) as a whole had a better mean score on the second test than did the corresponding experimental group. One can only guess at possible explanations why the reminiscence should have been greater in the control group than in the experimental. One explanation might be that high school students are very sensitive about standings, and the control group, feeling itself at a disadvantage in not making the trip, developed more reminiscence. Possibly reminiscence is related to the natural introversion at adolescence. In any case, the presence of reminiscence affected the scores made by the groups in the second test.

The discussion of reminiscence in this chapter has not been presented to detract from the conclusions to be reached in this experiment; rather, it is offered as a possible explanation for the increased scores on the second test, and as

a topic worthy of further study and research. The conclusions for the experiment are presented in the next chapter.

CHAPTER VI

CONCLUSIONS

In this chapter the results of the examinations will be examined separately at first, and then conclusions will be drawn from the combined results of all the control groups as against those of all the experimental groups. In order to present these conclusions in a meaningful way, it is first necessary to introduce a statistical instrument of measurement.

Levels of Confidence

Before putting a final interpretation to the results of this experiment it would be well to consider the concept of level of confidence as given by Lindquist:

> This expression, "level of confidence," can be readily related to the normal distribution. For example, we know that in any normal distribution 99 per cent of the cases lie within 2.58 standard deviations of the mean, or that 1 per cent deviate from the mean by more than that amount. Accordingly, we can make the statement at the 1 per cent level of confidence that any measure drawn at random from a normal distribution will deviate from the mean by less than 2.58 standard deviations. Similarly, if a single measure had been selected at random from a normal distribution, we may be confident at the 5 per cent level that it lies within 1.96 σ of the mean, or that its absolute deviation from the mean does not exceed 1.96 σ ("absolute" meaning that we are concerned only with the size of the deviation, no distinction being made between plus and minus deviations.) Similarly, we may be confident at the 2 per cent level that a measure drawn at random from a normal distribution will lie within 2.33 σ of the mean.[1]

---

[1] E.F. Lindquist, A First Course in Statistics, N.Y., Houghton Mifflin, 1942, p. 108.

Lindquist's concept of level of confidence may be applied to the significance of a difference between scores. It should be noted that the lowest per cent level represents the highest degree of confidence. This concept may be considered an extension of Garrett's concept of significant difference:

> It is customary to take a D/σ_D of 3 as indicative of a significant difference 'virtual certainty' since there is only 1 chance in 1000 that a difference of $+3\sigma$ will arise when the true difference is zero.[2]

Garrett's significant difference between test scores, 3.00, corresponds approximately to Lindquist's 0.1% level of confidence; which is another way of saying that the chances are one in a thousand that a difference of 3σ would arise if the true difference is zero. Lindquist's extension of the concept, however, admits of lower levels of confidence in results, thus showing to what degree a difference approaches significance. A level lower than 5% is generally considered not significant enough for ordinary purposes.

Test 1 -- The Test of Learning

For Pair One, the difference in the means was 3.46 in favor of the experimental group. This yielded a significance

---

2. H. E. Garrett, Statistics in Psychology and Education, 1946, Longmans, Green, N.Y., p. 213.

ratio of 0.50, indicating a 61% level of confidence that the true difference was not zero. The difference here is not significant.

For Pair Two, the difference in means was 0.33 in favor of the experimental group, with a significance ratio of 1.75. This ratio indicates an 8% level of confidence that the true difference was not zero. The difference here is not quite significant.

For Pair Three, the difference in means was 1.63 in favor of the experimental group, with a significance ratio of 1.41. This ratio indicates a 16% level of confidence that the true difference was not zero. The difference here is not significant.

Combining the means and standard deviations[3] for all three control groups and for all three experimental groups, for Test 1, the combined mean is 25.03 and the combined sigma is 4.08 for the control groups, and 26.25 and 4.20 respectively for the experimental groups. This gives a difference in means of 1.22 in favor of the experimental groups, with a significance ratio of 1.69. This ratio indicates a 9% level of confidence that the true difference is not zero. The difference here is not significant.

---

3. Ibid., formulas 24 and 25, p. 190.

Test 2 -- The Test of Retention

For Pair One, the difference in the means was 0.91 in favor of the experimental group. This gave a significance ratio of 1.00, indicating a 31% level of confidence that the true difference was not zero. The difference here is not significant.

For Pair Two, the difference in the means was 1.61 in favor of the experimental group, with a significance ratio of 1.34, indicating an 18% level of confidence that the true difference was not zero. The difference here is not significant.

For Pair Three, the difference in means was 0.38 in favor of the control group. This gave a significance ratio of 0.30, indicating a 76% level of confidence that the true difference was not zero. The difference here is not significant.

Combining the means and standard deviations for all three control groups and for all three experimental groups, we get a combined mean of 23.72 and a combined sigma of 5.00 for the control groups, and 24.52 and 3.74 respectively for the experimental groups. Thus, there is a difference in means of 0.80 in favor of the experimental groups, with a significance ratio of 1.05. This indicates a 29% level of confidence that the true difference is not zero. The difference here is not significant.

In both examinations, then, the difference in scores made by the experimental and control groups was not significant. A summary of the conclusions follows.

Summary of Conclusions

1. At the 9% level of confidence, the industrial visit resulted in better initial learning for the experimental groups that made the excursion. The significance ratio comparing the differences in test scores of the control with the experimental groups was 1.69. In other words, if it is hypothecated that the true difference was zero and that the observed difference was due to chance, this "null hypothesis"[4] could be rejected at the 9% level of confidence. This level is not high enough to reject the null hypothesis.

2. At the 29% level of confidence, the industrial visit resulted in better retention for the experimental groups that made the excursion. The significance ratio comparing the differences in test scores of the experimental with the control groups was 1.05. If it is hypothecated that the true difference was zero and the observed difference due to chance, this null hypothesis could be rejected at the 29% level of confidence. At this level it could not be rejected.

3. Statistically, the results of the tests do not show that the industrial visit definitely adds the power to fix details of occupational data in the minds of the pupils used in this experiment. Not much confidence can be held at the 9% level that the initial learning was greater for the experimental groups; and much less confidence can be held at the 29% level that the retention was greater.

---

4. Lindquist, op. cit., p. 130.

Has the guidance visit a value in the school situation? Has this experiment proved to experienced teachers using traditional methods that the excursion is worthy of inclusion in their repertoire of successful teaching techniques?

The failure of the statistical analysis to establish conclusively that learning and retention are increased by the excursion does not prove the guidance value of visits to industry to be nil. The children in the experimental groups received concrete impressions on their minds. When these pupils consider employment in the future, they will have something definite to visualize, and this will be far more effective than the abstract ideas formed by the pupils in the control groups. Even if the statistical measurements could not establish an increase in learning on the part of the experimental groups, this consideration would still uphold a guidance value of visits to industry.

Again, "Was this trip necessary?" If interest and enthusiasm have any value for children, the answer is <u>yes</u>.

BIBLIOGRAPHY

Atyeo, Henry C., The Excursion as a Teaching Technique, 1939, Doctor's Thesis, Teachers College, University of Columbia, 225 pp., reported in Bibliography of Research Studies in Education, U.S. Office of Education, Bulletin 1939, No. 5, p. 12.
Points to the higher value of the excursion technique than of all other methods with which it has been compared.

Bibliography of Research Studies in Education, United States Office of Education, Bulletin No. 5, 1938, 1939, 1940, 1941.
An annotated bibliography giving valuable resumes of published and unpublished researches.

Brownell, W.A., Some Neglected Safeguards in Control-Group Experimentation, in Journal of Educational Research, Oct. 1933, Vol. XXVII, p. 98-107.
A primary reference. Suggestions to overcome invalid results and over-standardization of the control-group method.

Bye, Edgar C., Direct Experience Through Field Studies in The Bulletin of the National Association of Secondary School Principals, May 1947, Vol. 31, p. 87-93.
A primary reference. Offers the excursion as an antidote to formal education.

Clark, Ella Callista, An Experimental Evaluation of the School Excursion, 1940, Doctor's Thesis, University of Minnesota, 231 pp., reported in Bibliography of Research Studies in Education, U.S. Office of Education, Bulletin 1941, p. 247.
Finds that pupils who took the excursion benefitted significantly better than pupils in control groups.

Courtis, S.A., Criteria for Determining Equality of Groups in School and Society, June 25, 1932, Vol. XXXV, No. 913, p. 874-878.
A primary reference. Very precise and exacting criteria developed and presented.

Encyclopedia of Educational Research, 1941, MacMillan, edited by Walter S. Monroe.
A bird's eye view of educational research in the United States. More than thirteen hundred pages of two columns containing definitions, articles, numerous referrals, and a fundamental bibliography of more than seven thousand references.

Engelhart, Max D., Techniques Used in Securing Equivalent Groups in Journal of Educational Research, Sept. 1930, Vol. XXII, No. 2, p. 103-139.

A primary reference. Less exacting than Courtis above; points to the general acceptance of equating groups based on general intelligence.

Frazer, James Anderson, Outcomes of a Study Excursion: a Descriptive Study, 1939, Doctor's Thesis, Teachers College, University of Columbia, 34 pp., reported in Bibliography of Research Studies in Education, U.S. Office of Education, Bulletin 1940, p. 18.

Analyzes the outcomes of a study excursion.

Frazier, Alexander, Is this School Trip Necessary? in Educational Administration and Supervision, Vol. 32, March 1946, p. 171-176.

A primary reference. Suggests a functional use of excursions.

McGeoch, Grace O., The Conditions of Reminiscence, in American Journal of Psychology, 1935, No. 47, p. 65-89.

A primary reference. Defines reminiscence, surveys literature in the field, and presents her conclusions.

Starch, D. and E. Elliott, The Reliability of Grading High School Work in English, in School Review, 1912, Vol. 20, p. 442-457.

A primary reference. Shows unreliability of essay-type examinations because of subjectivity in marking.

Williams, Osborne, A Study of the Phenomenon of Reminiscence, in Journal of Experimental Psychology, 1926, No. 9, p. 368-387.

A primary reference. Finds that girls exhibit a greater degree of reminiscence than boys.

APPENDIX I

THE TEST-REPORT AS SUGGESTED BY KOOS AND KEFAUVER[1]

1. Name and location of industry or plant

2. Why did you visit the industry?

3. Are employees chiefly men or women?

4. What proportion of the labor is skilled? Are there many young people? ..... How young? ..... Proportion .....

5. From what localities or countries does the raw material come?

6. Where is the market for the product?

7. What amount does the plant produce yearly? (tons, pieces, barrels, etc.)

8. What is the annual value for the product?

9. The physical plant

a. Character of building: materials .... old or modern .....

b. Is machinery guarded? Yes No Is there a safety organization?

c. Sanitary conditions: cleanliness, - Good, Poor; Lighting, Good, Poor; ventilation, Good, Poor.

d. Notice special labor saving devices. Give two or three examples.

---

1. L. V. Koos and G. N. Kefauver, Guidance in Secondary Schools, N.Y., Macmillan, 1932, p. 143.

10. Working conditions and welfare work

a. Wages paid? ..... Skilled ..... Unskilled .....

b. Hours of work ..... Number of days per week .....

c. Length of vacation periods for employees .. With pay....
Without pay .....

d. Is there a bonus or profit-sharing plan? Yes No

e. Is special education or training required? Yes No
Where could you get it?
How long would it take?

f. Do employees take part in management? Yes No

g. Is there a lunch room? Yes No
Are rest rooms provided? Yes No

h. Is medical and trained nurse service provided? Yes No

i. Give arrangements made for recreation.

j. Is there a pension system? Yes No

11. Give outstanding attractions of this occupation....

12. Give outstanding drawbacks of this occupation.....
.....

Note: Supply details whenever possible. Draw circles or underline words or word to indicate answer to questions given above.

APPENDIX ?

CANADA PACKERS EXAMINATION

DO NOT WRITE ON THIS PAPER.

On the sheet provided, write answers to the questions given below. Just put the letter of the correct answer opposite the proper number on your answer sheet. If you are not sure of the answer, you may guess. Try not to leave any blanks on your answer sheet.

1. There is a Canada Packers Plant in
   (a) Winnipeg
   (b) St. Boniface
   (c) Transcona

2. To get there we must take the bus at Portage Ave. and
   (a) Main St.
   (b) Gary St.
   (c) Fort St.

3. The name of the bus must contain the name,
   (a) Provencher
   (b) Tache
   (c) Marion

4. The Canada Packers Plant is on
   (a) Marion St.
   (b) Marion Ave.
   (c) Marion Blvd.

5. Of the workers at Canada Packers, there are
   (a) more men
   (b) more women
   (c) about the same number of men and women

6. Of the labor,
   (a) less than half is skilled
   (b) more than half is skilled
   (c) half is skilled and half is unskilled

7. Of the young people,
   (a) there are few
   (b) there are many
   (c) there are about as many as old

8. The youngest you may be to get a job at Canada Packers is
   (a) 16
   (b) 18
   (c) 20
   (d) 21

9. The province from which Canada Packers does <u>not</u> receive raw material is
   (a) Alberta
   (b) Saskatchewan
   (c) Manitoba
   (d) Ontario

10. The market for Canada Packers products is
   (a) Canada only
   (b) Overseas only
   (c) Canada and Overseas

11. The total weight in pounds of Canada Packers products in 1942 was
   (a) 1,000,000
   (b) 100,000,000
   (c) 1,000,000,000

12. The industry's work is
   (a) all done by hand
   (b) slightly mechanized
   (c) highly mechanized
   (d) all done by machinery

13. Starting wages for a girl, per hour, is
   (a) 60½¢
   (b) 70½¢
   (c) 80½¢

14. Starting wages for a boy, per hour, is
   (a) 83¢
   (b) 93¢
   (c) $1.00
   (d) $1.03

15. The number of hours of work per week is
   (a) 40
   (b) 44
   (c) 48
   (d) 100

16. The number of working days in a working week is
   (a) 4
   (b) 4½
   (c) 5
   (d) 5½

17. The shortest vacation is
    (a) 3 days
    (b) 7 days
    (c) 21 days

18. The longest vacation is
    (a) 21 days
    (b) 28 days
    (c) 3 months

19. During vacation employees receive
    (a) full pay
    (b) half pay
    (c) no pay

20. The company shares profits with the workers by
    (a) raising wages
    (b) giving Christmas presents
    (c) giving a bonus

21. Most of the jobs at Canada Packers require
    (a) special education
    (b) special training
    (c) "pull"
    (d) fine personality

22. This requirement can be obtained
    (a) on the job
    (b) at school
    (c) at university

23. The part employees take in management is
    (a) very much
    (b) very little
    (c) none at all

24. A nurse is in attendance
    (a) every morning
    (b) every afternoon
    (c) every morning and every afternoon

25. A doctor is in attendance
    (a) every morning
    (b) every afternoon
    (c) every morning and every afternoon

26. In 1947-48 sales amounted to
    (a) $1,000,000,000
    (b) $200,000,000
    (c) $10,000,000

27. In 1947-48 the total weight in pounds of goods produced was
    (a) over a billion
    (b) less than a billion but more than a million
    (c) about one million

28. Profit in 1947-48 was
    (a) less than $1,000,000
    (b) $1,000,000
    (c) more than $2,000,000

29. The profit per pound was
    (a) 1/7¢
    (b) ½¢
    (c) 1¢

30. In the slaughtering room one of the things they do is
    (a) grinding
    (b) shackling
    (c) packaging

31. One of the Canada Packers products is
    (a) Domestic Shortening
    (b) Mazola Oil
    (c) Swift's Lard

32. Weiners are cooked in
    (a) special wax paper
    (b) cellophane
    (c) animal skin

33. Pharmaceuticals means
    (a) medicines
    (b) farmers' tools
    (c) feed for farmers' hogs

34. In soap making, the main ingredient is
    (a) wood ashes
    (b) acids
    (c) fats

35. Salt is added in the soap-making process to separate out
    (a) the glycerine
    (b) the saponifier
    (c) the tallow

.....
(Name)

.....
(School)

.....
(Birthday and Year)

.....
(Date today)

1.		18.	
2.		19.	
3.		20.	
4.		21.	
5.		22.	
6.		23.	
7.		24.	
8.		25.	
9.		26.	
10.		27.	
11.		28.	
12.		29.	
13.		30.	
14.		31.	
15.		32.	
16.		33.	
17.		34.	
		35.	

Fig. 1. Test answer slip

1.	b	18.	a
2.	c	19.	a
3.	c	20.	c
4.	a	21.	b
5.	a	22.	a
6.	b	23.	c
7.	b	24.	c
8.	b	25.	c
9.	d	26.	b
10.	c	27.	a
11.	c	28.	c
12.	c	29.	a
13.	c	30.	b
14.	b	31.	a
15.	b	32.	b
16.	c	33.	a
17.	b	34.	c
		35.	a

Fig. 2. Key to test

APPENDIX 3

AGE, I.Q., P.R., AND EXAMINATION RAW SCORES

TABLE V

Age in Months and I.Q. of Pupils in the Control Group, Pair One

PUPIL	AGE IN MONTHS	I.Q.
D.R.	148	107
G.M.	139	105
G.H.	143	106
J.C.	156	109
P.N.	157	87
D.F.	154	91
R.M.	136	97
R.D.	148	92
E.D.	154	104
G.F.	142	134
J.K.	135	132
B.P.	137	116*
A.B.	149	106
B.K.	133	115
J.T.	136	102
H.B.	134	127
B.Mc.	147	119
B.K.	157	104
M.R.	148	92
F.B.	151	113
J.E.	168	83
B.T.	133	125
R.T.	147	101
B.T.	156	89
L.G.	135	94
B.S.	125	133
B.C.	135	96
B.J.	136	94
B.C.	130	103
W.R.	130	103
L.K.	135	100
B.W.	129	96
J.Mc.	137	102

TABLE VI

Age in Months and I.Q. of Pupils in the Experimental Group.

Pair One

PUPIL	AGE IN MONTHS	I.Q.
A.D.	135	102
R.H.	145	108
M.Y.	130	84
I.Y.	149	104
G.D.	142	107
D.W.	137	135
R.G.	134	130
D.S.	129	91
T.K.	157	89
A.K.	137	91
B.L.	12[illegible]	102
K.D.	120	112
B.B.	115	1[illegible]6
J.H.	122	100
M.P.	132	104
T.Mc.	131	96
B.F.	124	103
G.S.	118	127
M.M.	141	103
B.B.	129	120
H.P.	130	110
D.M.	141	88
E.Z.	144	97
R.H.	133	122
C.K.	120	105
A.S.	117	105
A.B.	127	115
H.G.	125	132
B.B.	126	97
J.B.	138	93
G.C.	128	85
M.M.	138	92
B.S.	124	109

TABLE VII

Ages and Percentile Ranks of Class Standings of the Control Group, Pair Two

PUPIL	AGE (Months)	CLASS STANDING	P.R.[1]
B.B.	165	4	91.25
R.S.	182	5	88.75
E.N.	165	8	81.25
R.W.	149	9	78.75
B.D.	166	12	71.25
F.H.	163	13	68.75
D.S.	171	14	66.25
E.Z.	162	17	58.75
J.C.	163	20	51.25
R.D.	174	21	48.75
R.A.	159	25	38.75
E.G.	189	28	31.25
T.H.	181	30	26.25
F.C.	180	32	21.25
R.K.	164	33	18.75
N.T.	203	36	11.25
P.W.	161	37	8.75
B.L.	167	40	1.25

1. Class standings were converted into percentile ranks by formula (15) in Garrett, op. cit., p. 31.

TABLE VIII

Ages and Percentile Ranks of Class Standings of Experimental Group, Pair Two

PUPIL	AGE IN MONTHS	CLASS STANDING	P.R.[2]
R.D.	161	2	96.25
D.L.	177	3	93.75
G.S.	178	6	86.25
E.G.	179	7	83.75
E.C.	168	10	76.25
E.N.	152	15	63.75
M.W.	158	16	61.25
R.S.	175	18	56.25
R.T.	168	19	53.75
A.K.	171	22	46.25
D.L.	171	23	43.75
R.M.	169	26	36.25
B.C.	162	27	33.75
R.O.	172	29	28.75
K.F.	196	34	16.25
V.O.	175	35	13.75
W.S.	184	38	6.25
G.Z.	169	39	3.75

2. Class standings were converted into percentile ranks by formula (16) in Garrett, op. cit., p. 81.

TABLE IX

Ages and Percentile Ranks of the Control Group, Pair Three

PUPIL	AGE IN MONTHS	P.R.
G.G.	185	84
W.G.	185	97
G.H.	213	53
J.J.	198	71
S.K.	198	38
A.M.	187	14
A.M.	191	78
M.O.	182	91
A.P.	187	67
R.P.	192	35
E.P.	187	67
D.S.	191	53
J.S.	192	32
Z.S.	185	80
E.W.	194	51
W.Z.	197	51

TABLE X

Ages and Percentile Ranks of Experimental Group, Pair Three

PUPIL	AGE IN MONTHS	P.R.
S.A.	197	53
I.B.	194	8?
S.B.	187	88
J.C.	201	90
D.C.	190	98
W.C.	192	91
B.G.	189	90
H.G.	198	86
J.K.	187	73
W.K.	238	1
M.K.	191	69
M.N.	191	35
L.S.	200	80
S.S.	184	55
R.S.	181	53
A.U.	194	67

TABLE XI

Raw Scores on Examinations by Pair One

CONTROL GROUP			EXPERIMENTAL GROUP		
Pupil	Test 1	Test 2	Pupil	Test 1	Test 2
D.R.	20	21	A.D.	21	25
G.M.	14	11	R.H.	27	24
G.H.	27	23	M.Y.	15	20
J.C.	27	20	I.Y.	18	22
P.N.	20	23	G.D.	26	24
D.F.	26	26	D.W.	26	28
R.M.	24	20	R.G.	24	28
R.D.	18	19	D.S.	20	20
E.D.	26	23	T.K.	23	24
G.P.	25	27	A.K.	23	19
J.K.	28	25	B.L.	25	17
B.P.	25	27	K.D.	16	20
A.B.	28	24	B.B.	26	24
B.K.	24	23	J.H.	21	18
J.T.	26	22	M.F.	25	24
H.B.	26	23	T.Mc.	24	16
B.Mc.	28	28	B.F.	27	22
B.K.	26	23	G.S.	21	23
M.R.	23	27	M.M.	24	24
F.B.	24	19	B.B.	21	24
J.E.	24	18	H.P.	26	27
B.T.	23	21	D.M.	29	23
R.T.	24	18	E.Z.	28	26
B.T.	20	24	R.M.	25	23
L.G.	17	19	C.K.	25	23
B.S.	27	28	A.S.	28	23
B.C.	21	22	A.B.	28	26
B.J.	21	19	H.G.	26	22
B.C.	25	22	B.B.	27	25
W.R.	21	21	J.B.	23	21
L.K.	17	23	G.C.	27	27
B.W.	25	22	M.M.	27	21
J.Mc.	25	27	B.S.	18	21

TABLE XII

Raw Scores on Examinations by Pair Two

CONTROL GROUP			EXPERIMENTAL GROUP		
Pupil	Test 1	Test 2	Pupil	Test 1	Test 2
B.B.	28	28	R.D.	31	24
R.S.	27	22	D.L.	31	27
E.N.	25	26	G.S.	31	21
R.W.	23	21	E.G.	31	29
B.D.	31	25	E.C.	28	20
F.H.	31	26	E.N.	27	24
D.S.	25	29	M.W.	26	31
E.Z.	27	27	R.S.	27	25
J.C.	21	21	R.T.	30	23
R.D.	14	17	A.K.	24	23
R.A.	31	27	D.L.	23	23
E.G.	22	22	B.M.	18	26
T.H.	22	22	B.C.	21	18
F.C.	23	21	R.O.	31	28
R.K.	27	18	K.F.	29	24
N.T.	27	23	V.O.	28	29
P.W.	25	20	W.S.	29	[illegible]
B.L.	24	17	G.Z.	30	26

TABLE XIII

Raw Scores on Examinations by Pair Three

CONTROL GROUP			EXPERIMENTAL GROUP		
Pupil	Test 1	Test 2	Pupil	Test 1	Test 2
G.G.	24	29	S.A.	26	32
W.G.	34	28	I.B.	29	29
G.H.	23	29	S.B.	29	26
J.J.	25	20	J.C.	29	28
S.K.	25	19	D.C.	33	29
A.M.	27	31	M.C.	32	30
A.M.	33	32	B.G.	26	27
M.O.	30	28	H.G.	30	30
A.P.	30	31	J.K.	33	32
R.P.	29	33	W.K.	28	29
E.P.	30	29	M.K.	34	34
D.S.	31	31	M.N.	28	28
J.S.	22	30	L.S.	30	23
Z.S.	27	29	S.S.	24	24
E.W.	28	25	R.S.	34	27
M.Z.	31	30	A.U.	30	27

TABLE XIV

Raw Scores on Examinations by the Special Control Group

Pupil	Test 1	Test 2
M.G.	16	17
J.W.	13	14
J.K.	15	22
S.C.	12	17
D.W.	17	17
D.Mc.	10	18
N.A.	15	14
A.K.	13	15
M.S.	13	12
M.M.	13	18
M.R.	13	14
D.L.	16	19
B.C.	15	15
E.C.	15	15
L.B.	13	14
J.L.	17	22
H.G.	16	17
B.K.	13	16
K.H.	18	11
J.H.	7	13
J.Y.	14	15
L.V.	16	18
J.Y.	11	14
C.V.	9	10
F.H.	12	21
R.J.	18	21
G.K.	11	12
A.K.	11	11

APPENDIX 4

AN ABSTRACT OF

The Guidance Value of Visits to Industry[1]

The central problem of this thesis is to discover whether, and to what extent, the overt act of an industrial visit will help to fix details of occupational data in the minds of pupils, in comparison with the usual methods of lecturing, demonstrations, observation of charts and photographs, discussion, but no visitation.

One hundred sixty-two school children in Winnipeg, Manitoba, are divided into three pairs of experimental and control groups, together with one special control group. Pair One consists of pupils in an elementary school; Pair Two consists of pupils in a junior high school; and Pair Three consists of pupils in a senior high school. All groups (except the special control group) are taught the same lesson on meat packing as it takes place at Canada Packers Ltd., St. Boniface, Manitoba. Only the experimental groups make the excursion to the plant, and this constitutes the experimental factor. Immediately after the trip, all groups write the same examination. More than a month later they rewrite it. The results

---

1. William Harrison Lucow, The Guidance Value of Visits to Industry, M.A. thesis presented through the Institute of Psychology to the University of Ottawa, Ottawa, 1950, xiii + 69 pages.

of the examinations are treated statistically to determine the significance of the difference between test scores. Measures on the first test are used to indicate the efficacy of the learning, and measures on the second test indicate retention.

Before presenting conclusions, the experimenter explores the phenomenon of reminiscence as displayed by the special control group.

Statistically, the results of the experiment do not show that the industrial visit helps to fix details of occupational data in the minds of the pupils used in the experiment. It is contended, however, that there are other factors than learning and retention in guidance, and that the value of the visits was not nil.

Appended to the body of the thesis are the following:

1. The test-report as suggested by Koos and Kefauver;
2. The Canada Packers examination;
3. Age, I.Q., P.R., and examination raw scores; and
4. An abstract of The Guidance Value of Visits to Industry.

THE END