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VOCATIONAL GUIDANCE AND JOB ANALYSIS

THE PSYCHOLOGICAL VIEWPOINT

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The purpose of this article is to discuss the relationship between the scientific study of vocations and vocational guidance. It serves, also, as an introduction to the two studies of vocations presented in this number of the PSYCHOLOGICAL CLINIC. These studies were prepared under the direction of the author and represent contributions from the Psychological Laboratory and Clinic of the University of Pennsylvania in the direction of scientific vocational guidance.

Much has been written on the methods of job analysis and on the application of these methods in the selection of competent workers and in the development of efficiency on the part of workers in industry. Job analysis has been defined as¹ "the dissection of each particular job into the component parts in relation to the qualifications of the worker responsible for its performance." In a recent issue of THE PSYCHOLOGICAL CLINIC² the author has discussed the application of job analysis in the selection and guidance of workers in a large industrial organization and has presented a technique for use in the analysis of jobs and a terminology to be applied in the description of the mental abilities required for success on these jobs. It is his purpose to discuss in this article the

¹ Hackett, T. D., "Job Analysis Aid to Production," *Iron Review*, Vol. 67, pp. 722-24

² Morris S. Viteles, "Job Specifications and Diagnostic Tests of Job Competency for the Auditing Division of a Street Railway; A Study in Industrial Guidance," *Experimental Studies in Psychology and Pedagogy*, No. IX, Psychological Clinic Press, Philadelphia, 1922, and PSYCHOLOGICAL CLINIC, Vol. XIV, Nos. 3-4.

application of the same method and the same terminology in a description of vocations for use in vocational guidance.

The term *vocational guidance* has been used in both a restricted and a general sense. In its restricted sense it refers merely to the guidance of children of the working age level in the choice of a vocation. The working age level, the 14 to 16 chronological age level, has been recognized as the most critical level in the determination of the future career of the individual. It is at this time that choice must be made between further education in a secondary school and separation from school. If the boy or girl enters the High School a choice must be made among the academic, the commercial, and the technical courses, and the choice automatically shuts out the student from certain vocations and restricts him to others. Boys and girls who leave school find a large variety of occupations from among which *one* must be chosen, and the choice exercises an enormous influence upon the ultimate vocational career of the child.

It is for these reasons that the working age level has assumed great importance in vocational guidance. In spite of the growing tendency to use the term in a more general sense, actual guidance programs are focused on the choice of vocation at this level. This involves, naturally, considerable attention to educational programs at approximately the working age level, to courses in study of occupations, etc., but in use the term is usually restricted to the efforts which are being made *to direct scientifically the choice of vocation by children at the working age level.*

In the more general sense the term *vocational guidance* refers to the direction of the education of the individual child—education in the school, the home, the playground—from infancy to maturity so that the child may be prepared for the vocation best adapted to his interest and abilities, in which he will render greatest service as a member of the social organism. It is guidance conceived most broadly, in the way it must be conceived if there is to be adequate and scientific direction in choice of vocation when the necessity for choice arises, at the working age level, at the time of graduation from the high school, from the university, and at any other time.

In the discussion of the relationship between job analysis and vocational guidance which follows the emphasis will be on vocational guidance in the restricted sense. The technique of job analysis

has an important bearing on the development of curricula, as has been pointed out by Strong,³ and therefore in guidance in the general sense, particularly since the ultimate aim of vocational guidance, in whatever sense the word is used, is the selection of a vocation by the individual. In this article, however, the discussion is limited to the relationship between the study of vocations and the practical problem of guiding children at the working age level. Actual choice of vocation is given first consideration.

Such guidance presupposes in my opinion a very thorough analysis of vocations in terms of the mental qualifications necessary for success in them. In practice guidance has advanced far beyond the accumulation of scientific data on the mental requirements of vocations. It has, as a matter of fact, become common practice to attempt to analyze carefully the mental qualifications of the individual, but relatively little effort has been made to analyze the vocational demands with which such an analysis must be correlated in adequate guidance. It is true that in recent years studies of occupations have appeared, but these have been concerned mainly with what might be described as the *extrinsic* rather than the *intrinsic* qualities of the vocations. Opportunities offered by the vocation, its advantages and disadvantages, and to some extent its duties, have been described at length in both popular and semi-technical reports. In practically all of them, however, the facts which are most important from the point of view of guidance, the facts concerning the mental abilities and temperamental qualities necessary for success, have received but scanty attention. In this particular respect, as in many other phases of guidance, sentimental opinion takes the place of facts which can only be revealed by careful and arduous analysis.

The article considers the problem of the extent to which the vocational counselor must employ the data furnished by job analysis in determining whether a given individual should remain in school, which course he should take, whether he should go to work, and whether he should enter the vocation of printing, or carpentry, or bookkeeping, or one of the many other vocations (if he is leaving school). It presents, moreover, a technique of job analysis and suggestions for presenting the facts obtained by such an analysis which are, in the opinion of the author, particularly

³ See E. K. Strong, Jr., and R. S. Uhrlock, "Job Analysis and the Curriculum." *Personnel Research Series*, No. 1, Baltimore, 1923.

applicable in substituting the facts of vocational qualifications for opinion in vocational guidance.

THE ESSENTIALS OF VOCATIONAL GUIDANCE

In vocationally guiding both children and adults, the vocational counselor, whether he be a trained psychologist or not, must consider the following factors with reference to the individual he is counselling.

- 1.—*Interest*
- 2.—*Competency*
- 3.—*Temperament*
- 4.—*Health*
- 5.—*Education and Experience*
- 6.—*Appearance*
- 7.—*Social and Economic Factors*

Interest

Interest refers to the desires of the individual. In the case of a child at the working age level interest is rarely restricted to one occupation. If interest is restricted, and it is found that the interest is well founded, it may merely be the function of the counselor to determine whether or not the individual possesses the *mental ability*, the *temperament*, the *health*, and *education* to attain proficiency in the vocation of his choice, and whether the *social and economic factors* make it possible and desirable for him to enter this vocation. In some cases it may be necessary to attempt to divert the *interest* toward another and more desirable vocation. In most cases, however, it is the problem of the vocational counselor to determine for which vocation among a number in which the individual is equally interested, he is most competent, and this need for selecting the right vocation from a number of vocations in which the individual is equally interested complicates the problem of guidance. In many instances, moreover, there is an almost total absence of *interest*. There is not even a general interest in many vocations, but merely a negative attitude, an absence of desire which is oft times the direct result of the failure of the school to supply the information about vocations which lies at the basis of vocational interest.

Competency

The second factor in guidance is *competency*. It refers to the mental ability of the individual to meet the requirements of a

given vocation. Vocational competency has been stated in terms of "general intelligence" and in terms of "specific mental abilities." The validity of one or the other point of view cannot be discussed in detail at this point. The author is of the opinion that vocational competency, in the great majority of cases, can be accurately described only in terms of specific mental abilities.⁴ But, whether one or the other point of view is held, or a combination of both, it is certainly true that in so far as vocational competency refers to the mental qualifications prerequisite for success in a vocation, an adequate consideration of this factor in guidance presupposes a careful scientific analysis of the demands of vocations in terms of such qualifications. Moreover, after the analysis has been made, it is necessary to devise instruments to determine the existence or absence of the required mental ability in a given case. The judgment of the counselor upon the presence or absence of such ability is unreliable. Psychological tests are the instruments which have been devised to measure competency, and the results of such tests, properly administered and evaluated by a trained examiner, must be substituted for the judgment of counselors in the determination of the vocational competency of applicants for guidance.

There are two contributions which the psychologist can make toward the more scientific analysis and measurement of vocational competency.

1. He can make an analysis of competency or qualifications for vocations in terms of specific abilities. He can substitute for such vague mental qualities, as dependability, alertness, force, good habits and other vague terms in common use in describing vocational competency a category of the specific abilities which go into each of the occupations grouped into a vocation. He is, moreover, prepared by training and experience in psychological analysis to weigh the relative importance of each one of these abilities in vocational success.

2. The psychologist can provide quantitative methods for testing individuals for the possession of the competency which a particular vocation demands.

A number of attempts have been made, in the first place, to analyze the demands of vocations, and in the second place, to devise instruments for measuring vocational competency.

⁴See Morris S. Viteles, "Tests in Industries," *Journal of Applied Psychology*, March, 1921, Vol. V, pp. 57-63.

The Analysis of Vocational Competency

The earliest attempts at vocational analysis were those made by French and German psychologists⁵ "who have been especially active in advocating the practice of submitting to careful and detailed experimental examination the physical and mental characteristics of men who have achieved marked success in their chosen vocations. By the application of this clinical method to men of superior attainment it is hoped that light may be thrown on the psychological foundations of their genius and, in general, on the relation between mental traits, as shown in the results of psychological tests, and actual success in life's work. This psychographic method represents the earliest methodical attempt to differentiate the various vocations from one another on the basis of special aptitudes and characteristics, as distinguished from the factor of general intelligence."

Dr. E. Toulouse has published reports of such examinations or psychographs in the cases of Zola, the novelist, Dalou, Henri Poincaré, the mathematician, and others. For example,⁶ "Zola's type was found to be characterized by prominent voluntary intellectual activity, clearly conscious and intense, concentrated effort, with no tendency to perseveration of ideas after cessation of work. His thought, as disclosed by the tests, was logical, methodical, and (in spite of his actual vocation) seemed preëminently fitted for the work of mathematical deduction."

The method of the individual psychograph has not yielded "results which are sufficient to inform us why the particular individuals examined were so much more successful in their work than were others who seem to have been equally favored and equally diligent. Nor has it yet revealed in any adequate way the nature or degree of the qualifications requisite for success in vocations from which the representative men have been selected."

The *individual psychograph* represents more the personal prejudices, the educational advantages and disadvantages, "accident of time and place," of the few men who have been eminently successful than a careful, impartial analysis of the abilities which have made for the success of the many mediocre workers in each

⁵ H. L. Hollingsworth, *Vocational Psychology*, D. Appleton & Co., New York, 1916, p. 80.

⁶ *Ibid.* 86-87.

⁷ *Ibid.* p. 88.

field. An analysis of the mental characteristics of a great number of men who have been successful in a given vocation may yield data which will be of service in vocational guidance, but a study of the duties and operations of vocations, the conditions under which they are carried on, will, in the opinion of the author, give much more exact information on the mental qualities pre-requisite for success than the method described above. Moreover, the failure to analyze and define accurately the terms which have been used in describing the qualities characterizing the successful men who have been studied destroys almost entirely the value of such data as has already been obtained by the above method.

The method by which the successful individual is studied has been replaced, or perhaps it is better to say re-enforced, by the study of the vocation with the view of determining the necessary mental qualifications. This method proceeds by studying the operations or performances of a vocation and determining the necessary mental qualities which these demand. Diverse procedures have been followed in making such studies. In some cases questionnaires have been sent to employers and they have been asked to tell the mental and moral qualifications for given vocations. In other cases trained and untrained observers have made a personal study of vocations and endeavored to analyze the necessary mental qualifications. In some cases workers have been consulted in the effort to arrive at an accurate statement of the vocational demands.

The leading agencies interested in the preparation of such analysis for the purpose of vocational guidance have been bureaus for vocational guidance such as the White-Williams Foundation of Philadelphia. The description of occupations prepared by such bureaus, although admirable in many ways, are particularly inadequate in their statements of the necessary mental qualifications for vocations, even in the case of descriptions prepared primarily for the use of counselors rather than for the use of children. Thus, for example, in a description of the occupation of dental mechanic, based on visits to 41 plants, the qualifications of a dental mechanic are described as follows: "Mechanical ability, especially deftness of fingers, is a prime essential. The boy must be fairly intelligent and he must have the patience to do careful work. Education through the grammar school is helpful, but not considered

⁸ Ruth J. Woodruff, "The Dental Meechanic," *The White-Williams Foundation Monograph Series*, No. 4, Philadelphia, Pa., June, 1923, page 3.

essential. Some mechanics have found chemistry and metallurgy profitable.”

In the same way the qualifications of a librarian are described as follows: ⁹“ A love of reading is not a major qualification since a librarian has little time for reading. She needs accuracy, quickness, neatness, a pleasing appearance and the application necessary to do much routine work. All these qualities must be founded upon a sincere and active enthusiasm for the library work.

“For advancement to a position of head librarian or specialist she must constantly be her own teacher in assimilating current information. She must possess a liking for people with a natural desire to assist them. The executive must have breadth of vision. Scholarliness would be another fundamental.”

The qualifications of the manager of a professional photographic studio are described as follows: ¹⁰“Good taste in selecting art papers and characteristic tones and mounts, executive leadership and initiative, good personality, capacity for handling many details, willingness to adopt improvements in methods and materials, a sense of responsibility for the success and reputation of the firm, foresight in planning for the needs of employees, and, as an interviewer of patrons, tact, good manners, command of language, and good appearance are the chief qualifications of a successful studio manager.”

In such descriptions of mental qualifications the title of another occupation could, in many cases, be substituted for the one being described, and the statement would be equally accurate. Thus for example, in the description of the mental qualifications for librarian, the terms office worker, teacher, cashier in a department store, a scraper of celery in Campbell's soup factory, could be substituted for librarian, and the description would be equally applicable.

The outstanding deficiency in such statements of mental qualifications is the failure to define the terms which are used in describing the qualities necessary for success. The qualifications are stated in vague terms, almost incapable of exact definition, which convey entirely different ideas to different readers. In addition, the quali-

⁹ Florence B. Jennings, “The Librarian,” *The White-Williams Foundation Monograph Series*, No. 2, Philadelphia, Pa., June, 1923, page 5.

¹⁰ May Rogers Lane, “The Professional Photographer,” *White-Williams Foundation Bulletin Series*, No. 2, Philadelphia, Pa., Nov., 1923, pp. 31-32.

ties which are given are not rated quantitatively; there is no indication of the degree of each quality which is necessary for success and the relative importance of each.

In analyzing vocational competency there must be substituted for such vague qualities as "accuracy," "quickness," "mechanical ability," "initiative," and other indefinite terms of mental characteristics, a category of specific mental abilities which are involved in each vocation. Moreover, the description of the motive concepts, or concepts of temperament, such as "loyalty," a "sense of responsibility," "patience," "tact," "good manners," etc., must be treated separately from the description of the specific mental abilities which determine the capacity to perform the duties of a vocation. Cylinder press operator, dressmaker, tool maker, lawyer, bookkeeper, are patterns of behavior, the mechanisms of response of which are individual specific mental abilities. An analysis of these abilities similar to the one made by the author, covering the jobs in the Auditing Division of a street railway company, and those in the printing trade and textile trade, presented with this article will have to be made for each of the occupations in a vocation. A given vocation consists generally of a number of specific occupations. For example, the medical vocation includes such varied occupations as general practitioner, surgeon, diagnostician, etc. In the same way the vocation of printing includes the occupations of compositor, pressman, etc. A complete statement of vocational competency involves an analysis of the mental abilities necessary for success in each of the individual occupations.

It is not only necessary to indicate the specific mental abilities which are required in a given occupation, but it is also necessary to indicate the extent to which each occupation calls for a specific ability. In many cases the difference in competency between two occupations consists not in a difference in the number and kind of specific mental abilities for which each occupation calls, but in the extent to which each ability is called forth in the occupation. The difference is not one of content but of pattern, an emphasis in one occupation of certain specific mental abilities, which, by reason of a difference in the operations of the other one, are not emphasized in the second occupation. It is therefore necessary to give a quantitative rating to each ability with reference to the extent to which it is required for success in a given occupation. For this purpose a five point scale can be used, in which each of the

numbers, 1, 2, 3, 4, 5, represents a degree to which each specific mental ability is essential for success in the occupation. The meaning of each number is given below.

1. Negligible
2. Barely significant
3. Significant
4. Of great importance
5. Of utmost importance.

In other words, thinking in terms of the mental abilities which are called for in a given occupation, 1 means that the importance of the ability so rated is practically negligible in occupational success; 2 means that this ability is called for to such a slight extent in the occupation that a deficiency in it on the part of the worker interferes only slightly with the capacity of the worker to perform efficiently the duties of that occupation; 3 means that the ability is significant, but that it is not one which particularly distinguishes this occupation from other similar occupations; 4 means that the ability is essential and that it is called for to such a great degree that a deficiency in it on the part of the worker engaged in the occupation would interfere seriously with efficiency; 5 means that the occupation requires this ability to such an extent that a deficiency in it on the part of the worker would make him absolutely incompetent to render satisfaction.

The terms used to denote the mental abilities necessary for vocational success are adapted from the Analytic Diagnosis Chart, prepared by Dr. Witmer for use in the Psychological Clinic at the University of Pennsylvania. This chart was evolved from the experience of the Director of the Psychological Clinic, with the assistance of a number of investigators and clinicians. An early form of this chart, embodying the essential features of a rating chart, and employing the five-point scale, is reported as having been used in an investigation of one thousand children in the Public Schools of Camden, New Jersey, as early as the year 1906-07.¹¹

In order to facilitate the use of these terms in the analysis of the mental requirements of the various occupations which are found in a given vocation, a blank form is used, similar to the "Job Psychograph for Hand Compositor" reproduced below. It

¹¹ *Experimental Studies in Psychology and Pedagogy*, No. 5, "A Clinical Study of Retarded Children," by Jacob Daniel Heilman, Ph.D., Philadelphia, The Psychological Clinic Press, 1910.

will be seen that on the left-hand side of the form are given the specific mental abilities. To the right of these are five columns numbered 1, 2, 3, 4, 5, respectively. Each specific mental ability which is required by the occupation is checked with an X. The X is placed in one of the columns marked 1, 2, 3, 4, 5, with reference to the degree to which the ability is significant in occupational success. The three specific mental abilities which most definitely distinguish the job, that is, which are of greatest importance for success in the occupation are checked with XX.

JOB PSYCHOGRAPH FOR HAND COMPOSITOR

	1	2	3	4	5	Remarks
1. Energy.....		x				
2. Rate of Discharge.....				x		
3. Endurance.....				x		
4. Control.....		x				
5. Co-Ordination A.....			x			
6. Co-Ordination B.....			x			
7. Initiative.....	x					
8. Concentration.....			x			
9. Distribution.....				x		
10. Persistence.....					xx	
11. Alertness.....			x			
12. Associability.....			x			
13. Discriminability:						
a/V.....					xx	
b/A.....	x					
c/T.....			x			
A. Space Perception.....				x		
B. Form Perception.....				x		
14. Accuracy.....			x			
15. Memory:						
a/V.....	x					
b/A.....				x		
c/K.....	x				xx	
16. Understanding A.....			x			
17. Understanding B.....			x			
18. Observation.....			x			
19. Planfulness.....				x		
20. Intelligence.....	x					
21. Intellect.....			x			
22. Judgment.....		x				
23. Logical Analysis.....	x					
24. Language Ability.....	x					

If the X's on the chart are connected by a line we have what I have called a *job psychograph*. If this is held so that the names of the specific abilities come at the bottom of the sheet and the broken line stretches horizontally across the page, the peaks of the curve reveal at a glance the specific mental abilities, which, in the opinion of the one who is making the job analysis, are the ones

which are most essential in occupational success. These abilities can be called the "keystone" specific mental abilities of the occupation and they are correlated to the "keynote" operations of the job or the activities which most clearly distinguish this occupation from other similar occupations.

Such an analysis of occupational competency is of prime importance in vocational guidance. The aim of guidance should be to select for the individual the vocation and, if possible, the specific occupation, for which, from the point of view of mental ability, he is most fitted. This can only be accomplished if the mental abilities which the individual possesses are compared with those which the vocation demands; in other words, if the psychograph of the individual is compared with the *job psychographs* of the vocation. As a matter of fact, the chief problem of vocational guidance at the working age level is to choose for the individual an occupation the psychograph of which corresponds with his individual psychograph. *The job psychographs can only be obtained by an accurate study of each vocation by trained observers reinforced by the judgment of workers and employers.* Only such a job analysis can give an accurate picture of the mental qualifications which must be possessed for success in a given vocation, without which the prospective worker is doomed to failure. It appears to the author that perhaps the most important contribution toward practical vocational guidance at the present time is to be sought in the scientific analysis of vocational guidance such as is discussed in this article.

The description of specific mental abilities¹² used in this investigation and suggested for use in job analysis are as follows:

1. *Energy.* By energy is meant the degree of physical force necessary for success in the occupation. It is perhaps illustrated by the difference between the occupation of laborer, in which the amount of energy would be rated as 5 on a five-point scale, and the crossing watchman at a country crossroad on a railroad in which there are just a few trains a day, in which case the amount of energy to be expended would be rated as 1.

2. *Rate of Discharge.* By this is meant the speed with which energy is called forth by the occupation. In some occupations

¹²See W. H. Young, "Physical and Mental Factors Involved in the Form Board Test," *PSYCHOLOGICAL CLINIC*, Nov. 5, 1916.

H. J. Humpstone, "The Analytic Diagnosis," *PSYCHOLOGICAL CLINIC*, May 15, 1919.

much energy may be called forth, but this energy is called forth slowly, while in others it must be expended with great speed. The reverse is also true; that is, there are occupations in which the amount of energy demanded is low, but it may be required that this be expended either at great speed or slow speed.

3. *Endurance.* By endurance is meant the degree to which the ability to resist fatigue is required by the occupation. It is equivalent to what is ordinarily called "stamina" and refers to the degree to which the occupation demands the ability to discharge energy beyond the limit of physical fatigue.

4. *Control.* By control is meant the ability which is demanded in the direction and execution of large bodily movements. Walking, for example, involves control to a very great degree. In the realm of occupations, shoveling dirt from a sand car out on the street would require control to the extent of 5 on a five-point scale. This would be contrasted with, let us, say, comptometer operating, in which the emphasis would be more upon co-ordination than upon control. Control would be rated 5, for example, in the running of a street car.

5. *Co-ordination.* (A) This refers to the occupational requirement in the combination of fine muscular movements; in the establishment of finer adjustments among these movements. The importance of this ability rates high in such occupations as fine instrument making, comptometer operating, and in fine armature winding.

6. *Co-ordination.* (B) This refers to the harmonious combination of eye and muscle action demanded by the occupation. It is movement controlled by sight. It is important in such an occupation as telephone operating, in which the operator is required to get the plug into a hole of small diameter, the location of which is perceived through the eye.

7. *Initiative.* This refers to the self-starting aspect of the occupational demand. It is the ability of the individual to begin a new operation without instruction. It is required to some extent in running the trolley car, exhibiting itself when trouble arises in the mechanism of the trolley car or on the road. It is found to a much less degree in, for example, the occupation of interurban railway receipt audit, and to a much greater degree in that of "shooting trouble."

8. *Concentration.* This refers to the attention which the occu-

pation requires to be given to one unit, or one small part, in contrast to the distribution of attention over a number of parts. For example, a man who is feeding an automatic punch press uses concentration of attention to the extent of 5, inasmuch as he attends only to one single operation, to one single thing. It is attention to individual, single component parts of a complex operation or object in contrast to attention spread over a number of parts of a complex operation or object.

9. *Distribution.* This refers to the distribution of attention which the occupation requires over a number of different operations or things at the same time. For example, the motorman distributes his attention over the street, the control apparatus which he is handling and the signals which come from the conductor at the same time. A man who is starting a lathe distributes his attention over a number of levers in starting the lathe. The sub-station operator may be required to distribute his attention over a number of switches simultaneously.

Distribution is contrasted with concentration. In some occupations one is exemplified and in some the other. It is possible that in certain occupations both may be required to approximately the same degree.

10. *Persistence.* This refers to the stick-to-it-iveness demanded by the occupation. It is the ability which the occupation calls for of giving entire attention to the matter at hand until it is completed. It is the opposite of fluctuation of attention, in which attention wanders from the matter at hand.

11. *Alertness.* This is the readiness which the individual must show on the occupation in meeting changing situations. It is wide-awakeness. It should be rated as an important requirement on the occupation of motorman and relatively of less importance in that of running a mimeographing machine.

12. *Associability.* This refers to the number of discreet units which must be associated in one moment of consciousness. Some occupations require that the individual be able to hold in consciousness only two or three things at once, and others that they may be able to hold as many as six or seven. In running a street car the individual will need a memory span of at least four in order to be successful on the job. In an occupation such as that of listing clerk a long memory span will be of great help. In still others such as feeding a drill press, a memory span of three and possibly less is sufficient for efficiency.

13. *Discriminability.* This refers to the ability required of recognizing differences in size, shape, sound, taste, etc. The smallness of the difference it is necessary to recognize in a given occupation is a measure of the degree of discrimination required by the occupation.

Discriminability is employed in each of the several sense realms, and we have therefore:

- (a) Visual discriminability.
- (b) Auditory discriminability.
- (c) Tactile discriminability (touch).
- (d) Kinaesthetic discriminability (differences in movement).
- (e) Olfactory discriminability.
- (f) Gustatory discriminability.

It is necessary to differentiate the kinds of discriminability which are to be rated in making ratings in different occupations.

In order to bring into relief the discriminability complexes which it will most often be necessary to rate, the following two items are provided.

A. *Form Perception*, or the degree to which the ability to discriminate differences in shape, is demanded.

- 1. Visual. By means of sight.
- 2. Tactile-Motor. By means of touch and movement.

B. *Space Perception*, or the degree to which the ability to discriminate differences in distance, is required.

- 1. Visual. By means of sight.
- 2. Tactile-Motor. By means of touch and kinaesthesia, *i. e.*, the recognition of small differences in movement through space. For example, in creeping out on a ledge, etc.

14. *Accuracy.* This refers to the degree to which the complex of abilities (Attention, Discrimination, etc.), which makes it possible for an individual to do with exactness the work to which he is assigned is demanded by the occupation. It is important in meter reading and in many clerical occupations, and less important in laboring jobs, gross repair work, etc.

15. *Memory.* This refers to the ease of learning and the persistence of retention required by the occupation. There are three specific types of memory, in three specific sense fields, to be considered in giving a rating on Memory. These are:

- A. *Visual*, or the memory of visual material.
- B. *Auditory*, or the memory of auditory material.

C. *Kinaesthetic*. This refers to motor memory, or the ability to recall movements.

16. *Understanding*. This refers to ability to understand directions as part of the occupational qualifications. It is the degree of comprehension of verbal or written directions demanded. This is probably involved in all occupations, but the degree of its importance will vary from occupation to occupation.

17. *Understanding Q*. This refers to the readiness or quickness with which directions must be understood. In some occupations the directions can be read at a pace established by the worker and plenty of time taken to interpret them. In others it is essential that the directions be grasped and understood readily. Trouble shooting is an example of an occupation in which quickness of understanding would be rated high.

18. *Observation*. This refers to the ability which is called forth by the occupation of employing attention so that no detail of the performance remains unnoticed. The individual must always be aware of what he is doing and keep accurate tab on minute details of the job which he is doing. The occupation of proof-reading, for example, would have to be rated high on observation because it is necessary for the proof-reader to notice every minute detail of the proof. A typist, copying from rough draft, would also be rated high on observation, although not quite as high as a proof-reader. And in such a job as shoveling coal, observation would be rated low.

19. *Planfulness*. This refers to the ability to look ahead, to foresee the general plan of the work, and to methodically plan or form a scheme for the method of doing the work as part of the occupational requirements. Supervising would be rated high in planfulness. The occupation of comptometer operating would probably be rated low.

20. *Intelligence*. This is the ability of the individual to solve a new problem. In most occupations new problems are not presented. They may occasionally arise in the process of running a street car, very often in "shooting trouble," but very rarely in clerical occupations.

21. *Intellect*. This refers specifically to the ability to put the kind of knowledge that is ordinarily obtained in the schools to use in the occupation. An occupation in which no knowledge of school work is at all required, not even reading and writing, should not

be checked at all. An occupation which requires simply the ability to read numbers or spell out words slowly should be rated as 1. An occupation in which reading and writing and little more of an intellectual nature would be required would receive a rating of 2. An occupation requiring the ability to use knowledge of about sixth grade standing, a rating of 3. An occupation of the intellectual level of the high school graduate would be 4, that which required collegiate or technical training would be given a rating of 5.

22. *Judgment*. This is the exercise of choice. It is the occupational demand for the selection for a best response from among a number of possible satisfactory responses, *e. g.*, train dispatching.

23. *Logical Analysis*. The ability called for by an occupation for the consideration in an impartial, rational way of the problems presented by the occupation. This ability is employed to any great extent only in relatively few jobs. A research assistant in a Research Department is an occupation which would be rated high with reference to this ability.

24. *Language Ability*. The extent to which the use of written and spoken language is an essential requirement for occupational proficiency. Information clerk, correspondence clerk would be occupations rating high in the requirement of this ability. Listing clerk, laborer would rate low.

25. *Executive*. This refers to the capacity for leadership required by the occupation. This is a complex, unanalyzed mental ability which can only be rated in a very superficial way. This is probably a complex of personality as much as it is one of specific ability, but it is tentatively included in this list.

The Measurement of Vocational Competency

It has been indicated above that in addition to providing an analysis of competency demands of certain vocations it is the function of the psychologist to provide quantitative methods for testing individuals for the possession of the mental traits prerequisite for success in particular vocations. The instruments of measurements are the psychological tests. Tests of vocational competency are based, of course, upon an analysis of the abilities required by vocations such as that described above. The value of these tests, moreover, must be empirically demonstrated either by the comparison of test results with the efficiency of those already engaged in a vocation or by the follow-up and comparison of test results of those examined by means of tests with their success in

various vocations. The studies of Woolley¹³ and Leaming¹⁴ are examples of the latter procedure. But such investigations have not been carried far enough to be of great service in the vocational guidance of children at the working age level to the great variety of vocations which are available to such children. The results of these investigations can be of service in determining whether or not a child has high school competency, whether he should be advised to remain in high school to prepare for one of the vocations for which training is there given. They are not, however, useful in directing toward specific vocations children, who, either by reason of deficiency in intellectual ability or for some other reason must be advised to leave school and must be immediately guided in the choice of an occupation.

In the guidance of such children and to some extent in the selection of the most suitable course in high school, use can be made of tests which have been devised for the selection of workers in industry. It might be possible to borrow from department stores, from printing establishments, from manufacturing plants, etc., in this country, the tests which they are using, and to determine by means of these the vocational competency of those who are being vocationally guided. This would perhaps be the soundest and most scientific method of measuring competency for vocational guidance. To date, however, few of these tests have been standardized in a manner which makes them of service in vocational guidance. For this reason the serviceability of the *job psychographs* described in this article is increased. By means of a qualitative analysis of performances on standard psychological tests such as the Witmer Form Board, the Witmer Cylinder Tests, the Dearborn Form Board, the Stenquist Mechanical Tests, and other performance tests, it is possible to make a judgment upon the degree to which an individual possesses the mental abilities described above. In other words psychological tests standardized for clinical use can be employed in vocational guidance. The test furnishes the occasion for a standardized performance which can be evaluated in the terms of the specific abilities listed above. The individual who is being ex-

¹³ H. T. Woolley, "A New Scale of Mental and Physical Measurements for Adolescents and Some of Its Uses," *Jour. of Ed. Psych.*, 1915, 6, 521-550.

¹⁴ R. E. Leaming, "Tests and Norms for Vocational Guidance at the Fifteen Year Old Performance Level," *PSYCHOLOGICAL CLINIC*, 1923, 14, 193-224.

amined can be credited with these abilities to the degree of 1, 2, 3, 4, 5, on the basis of his performance. The ratings can be entered upon Form MQ1, to give the *individual psychograph* of the applicant for guidance, which can be compared with the *job psychographs* of the different vocations. Such a qualitative analysis of performances on psychological tests and comparison with occupational demands appears to the author to possess greater possibilities for accuracy not only than the haphazard judgment of the vocational counselor and the analysis of the so-called general intelligence tests, but than the quantitative results of tests such as described by Woolley and Leaming.

In the two vocational studies reported in this number of the PSYCHOLOGICAL CLINIC are found a series of *job psychographs* covering the standard jobs in the printing trade and those of one phase of the textile trade. Until specific tests of job competency have been standardized for these vocations, the author suggests the use of the *job psychographs* in the manner described above for guidance toward these vocations. As a matter of fact, in the Vocational Guidance Clinic conducted by the author at the University of Pennsylvania this method is followed in guidance. Moreover, it is quite possible that even after specific vocational tests have been standardized for selection in these and other industries the quantitative method which, for one reason or another, must be used in industry, may not lend itself to the more complex and possibly more important problem of vocational guidance.

The use of such a method presupposes, of course, that the counselor has been trained in psychology or, at least, a co-operation between vocational counselor and a Psychological Clinic for Vocational Guidance such as is conducted at the University of Pennsylvania. It is not surprising that adequate guidance should involve psychological training on the part of the counselor or at least a co-operation with psychologists. The analysis of mental ability and defect, as the diagnosis of physical defect, is a specialized operation which presupposes prolonged scientific training. The acceptance of this point of view by counselors who are still speaking of mentality in vague, general terms and confusing scientific vocational guidance with a sentimental haphazard judgment of vocational competency may retard the speed with which the vocational guidance movement spreads; it can only serve, however, to set it on a firmer foundation.

Temperament

The third factor in guidance is *temperament*. By this is meant the motives, the urges in the individual's make-up.¹⁵ "It must certainly seem," says Watts in an article in the *British Journal of Psychology*, "that the vocational psychologist will need to take into consideration what has so far been overlooked, the instinctive make-up of the subjects of his experiments, and that in choosing workers for particular tasks he must make sure that their instinctive type is the right one. It would be folly to place the man with strong gregarious tendencies in lighthouse or wireless work, or advise him to go into farming in a new colony, just as it would be unwise to encourage a boy devoid of the acquisitive instinct to set up in business. And it will be agreed that a soldier or a reformer without a considerable spice of pugnacity would be a failure, while it is equally beyond dispute that the statesman and the priest, the doctor and the nurse, the teacher and the shepherd would soon tire of their work if they were not endowed strongly with the tender impulse."

It would be possible to quarrel with Watt's analysis of the "instinctive" qualities. It is also probably better to substitute the term *temperamental* for *instinctive*. It is certainly true, however, that in addition to abilities the motives and purposes of the individual must be considered in guidance. Two young men may be absolutely identical from the point of view of the mental abilities necessary for success as a surgeon; they may even receive the same training and profit equally from such training, but if one is tactful, even-tempered, congenial, and inspires confidence, he will certainly be better qualified for success in this occupation than the introverted, excitable individual who fails to inspire the confidence so necessary for successful work as a surgeon.

The qualities which are given are *temperamental* qualities. It is the point of view of certain psychologists that *temperament* plays an even greater part in vocational success than does *competency*. It is not my purpose to present the pros and cons of this point of view at this time. It is merely my purpose to emphasize the need for a consideration of the *temperamental* qualities necessary for vocational success, and to point out that such a consideration presupposes a thorough-going analysis of the duties and

¹⁵ F. Watts, "The Outlook for Vocational Psychology," *British Jour. of Psychology*, January, 1921.

conditions of work, of the sex and nationality requirements of various vocations and other facts which will throw light upon the temperamental qualities necessary for success in the vocation. Such an analysis must be psychological in character, employing the technique of the science and based upon a knowledge of the fundamental facts about human personality provided by this science.

In the measurement of these temperamental qualities psychology has not progressed very far. Experimental investigations which have been conducted in the measurement of such traits have not yet yielded data which can be of great service in actual guidance. The judgment of temperamental qualities must still more often be based upon an analysis of the facts gleaned from the life history of the individual, a consideration of his habits, his responses during the interview, the opinions of his teachers, parents, etc., than upon an analysis of standardized performances which give exact measures of these qualities.

The discussion of *temperament* brings with it the matter of attitude toward work. Attitude toward a vocation is expressed in terms of willingness, interest, etc. Differences in attitude toward work may be very closely related to differences in temperament. For example, the author examined recently a boy in the clinic whose attitude toward work was that of unwillingness. This attitude was altogether a result of the peculiar temperament of the boy. Deficiency in motor impulsion, in sense of responsibility, in reliability, were the factors which determined his unwillingness to work. It was not a dislike or an inability to perform the duties of the vocation in which he found himself, but simply what might be called a temperamental disinclination to perform the duties of a worker and a citizen which he was called upon to perform.

Attitude may also be a factor of ability. It is possible that interest in work accompanies the ability to do it,—that, as Woodworth states¹⁶—“human interests keep pace with human capacities. Almost always,” he writes, “where a child displays talent, he also displays interest. It might not be amiss to extend McDougall’s conception of the connection of instincts and emotions so as to speak of a native interest as the affective side of a native capacity. Along with the capacity for music goes the musical interest; along with the capacity for handling numerical relations goes an interest

¹⁶ Robert S. Woodworth, Ph.D., *Dynamic Psychology*, Columbia University Press, 1922, p. 74.

in numbers; along with the capacity for mechanical devices goes the interest in mechanics; along with the capacity for language goes the interest in learning to speak; and so on through the list of capacities, both those that are generally present in all men and those that are strong only in the exceptional individual."

There is practically no experimental evidence to substantiate this point of view, partly because it is so difficult to measure objectively the factor of interest. If such a relationship does exist, and the author leans toward this view, the importance of measuring mental ability is enhanced, because with the measure of such ability interest is in the practice of the vocation which is chosen, to a certain extent, also determined.

Health

The *health* of an individual plays an important part in vocational success, and this must therefore be given due consideration in vocational guidance. By health is meant not only the physical state of the body as a whole but the degree of development and the functional soundness of each part of the body. Boys with arrested tuberculosis cannot be advised to enter vocations which will expose them to sudden changes in temperature. Girls suffering from irremediable eye-conditions cannot be advised to enter millinery. A boy with a heart condition cannot be advised to select the vocation of tool-maker although from the point of view of other factors considered in guidance, toolmaking may appear to be a desirable vocation for the boy.

As in the case of *competency* and *temperament* the specific health requirements of the vocation can only be determined by a study of the vocation, by an analysis of the vocation in terms of the qualifications, physical as well as mental, necessary for the attainment of proficiency in each of the occupations. Such an analysis will also serve to reveal the strains and health hazards of a vocation, with which each vocational counselor must be well acquainted.

Education and Experience

Vocations differ with respect to amount of education and the amount and type of experience necessary for success. Educators and laymen alike have possibly more varying notions with reference to the amounts and kind of education necessary for success in various vocations than with reference to any other phase of the vocation. This is perhaps well illustrated by the varying educational

requirements which candidates for the degree of Doctor of Medicine must fulfill even in the same city. In the case of other professions, as well as in the case of many industrial and commercial vocations the same differences of opinion exist. For adequate vocational guidance the counselor must be acquainted with the educational requirements of the vocations toward which he is guiding the youth in his vicinity. This involves again a study of vocations with particular reference to the standards of educational attainment demanded by current practice in the vocation in the section of the country in which the counselor is working.

Prerequisite *experience* in like manner can only be determined by a thorough going study of vocational demands.

Appearance

The *appearance* of the individual must be weighted in guidance. This is perhaps not so important in the case of children of the working age level as in the case of adults, by reason of the possibility of changes in *appearance* accompanying physical growth. However, industrial organizations such as department stores, banks, etc., which employ juniors lay certain stress on *appearance* and the vocational counselor must cater to the prejudices of such organizations. Moreover, stature, weight, etc., must be considered in the case of other occupations to which children of the working age level are eligible. It is one of the functions of job analysis to analyse, among other things, the weight to be attached to *appearance* in guidance toward the various vocations.

Economic and Social Conditions

The seventh essential for adequate guidance is a consideration of the *social and economic conditions* influencing the life of the one who is being guided. A boy of fourteen who wants to become a physician, who, from the point of view of *competency, temperament, health, and education*, is suited for the vocation may be unable to afford the cost of training for this profession. It may therefore be absolutely necessary to consider and decide upon another vocation. In the same way it may be necessary to discourage the free play of *interest* and to advise a girl to enter another than the vocation in which she is most interested because she is dependent upon herself for support, and the wages of the second are higher than those of the first. The proper weighting of social and economic factors is in many cases a matter extraneous to the vocation, involving rather a

complete knowledge of the social background of the individual. In some cases, however, the earnings enter as a factor; the length of the training period may enter, and these involve a knowledge about earnings of different vocations, about the methods of training for them, which again is based upon the type of vocational study discussed in this article.

The above discussion serves, I believe, to show the relationship between job analysis and vocational guidance, to show the need of careful analysis of vocations as a preliminary to scientific guidance. There are, however, other considerations which demonstrate the necessity for vocational study. The counselor must not only be in a position to determine whether the *competency, health, etc.*, of the individual are such as qualify him for a given vocation; he must be prepared to tell his subject something about the opportunities for advancement offered by the vocation; its advantages and disadvantages as compared with other vocations; the provisions made for training; the rate of progress in the vocation, etc. In addition to telling the applicant for guidance about this, the counselor must actually weight these factors in guiding the boy.

THE REPORT

There still remains the question of the form into which the data obtained in the analysis of the vocation should be thrown. It appears to the author that a complete job analysis for use in vocational guidance must contain the following data about the vocation.

I. A *description of the occupations* which together make the vocation. As it has been pointed out above, a given vocation consists generally of a number of specified occupations. It is necessary to give not only a description of the duties of these occupations but a complete statement of the qualifications necessary for success in each of these. It is also necessary to outline the relationship among these jobs, in other words to indicate the lines of promotion from one to the other, or the route which the worker in the vocation must follow in order to arrive at the best of them. It appears to the author that a complete description of each occupation can most readily be given in the form of a *job specification*. Such a *job specification* must include:

- (1). A description of the occupation with special reference to its duties and conditions under which these duties are performed.

(2). The analysis of the physical qualification of the occupation.

(3). An analysis of the mental qualifications which the individual must possess in order to make a proficient worker.

(4). A statement of the factors such as the time and nature of the training, opportunities for promotion, etc., about which it is necessary to inform the worker.

The specific facts which must be included in such a description of the occupation are:

- (1). Name of job.
- (2). Preferred age.
- (3). Preferred sex.
- (4). Physical requirements.
- (5). Pre-requisite qualifications.
 - (a) Specific abilities.
 - (b) Education.
 - (c) Temperamental qualities.
 - (d) Experience.
- (6). Conditions of work.
- (7). Wages.
- (8). Statement of duties—a description of the duties of the job.
- (9). Analysis of operations—statement of units of operations in the job.
- (10). Time to learn.
- (11). Amount of training in the job.
- (12). Opportunities for promotion.
- (13). Advantageous and Disadvantageous Features.

Special forms can be used for preparing and presenting such occupational descriptions. The character of such forms is illustrated in the *job specification* which form part of reports accompanying this article. *The job psychograph discussed in the body of this report forms part of the job specification.* It is used to present the statement of the specific mental abilities necessary for success in each of the occupations grouped into the vocation. Such *job psychographs* have been devised for the jobs covered in the accompanying reports.

II. In addition to the description of each of the specific occupations in a vocation the job analysis must contain a *description of the status and economic importance of the vocation* in the region

in which the vocational counselor is situated. It is only from such a description that the vocational counselor is able to determine the relative value of the given vocation from a point of view of material return to the child and the opportunities for service to society. It is well to introduce the statement of the status and economic importance of a vocation by a short history of the vocation.

III. A description of the present status and economic importance of a vocation leads directly to a discussion of the *advantages and disadvantages of a given vocation* as compared with others which it is possible for the boy to enter.

IV. It is also necessary to provide a statement of the training which is given for each job but it is important to discover the *opportunities for training for the vocation* which are found in the immediate vicinity. For example; in one of the reports which follows this article a description is given of the opportunities for vocational training in printing offered by the Typothetæ in Philadelphia and by the Printing Trade Unions. The knowledge of such opportunities for vocational training is essential in adequate guidance.

The accompanying reports represent vocational studies prepared for use in vocational guidance. The reports represent intensive rather than extensive studies of the vocations. They are intensive in a sense that they represent a careful study and analysis of the specific mental and physical requirements for each of the vocations. They are based upon close observation in a few industrial establishments and not upon a superficial survey of a great number of plants. It is in this careful analysis of vocational qualifications that they differ most from descriptions of occupations published for the use of vocational counselors by other agencies.

In the description of the conditions of work these studies are not as reliable as they would be if a great number of plants had been visited. They are published, however, in the belief that in spite of this fault they can be of immediate and practical service in vocational guidance at the working age level.