

the efficiency of public education and its effectiveness as a means of preparing the youth of today for competent economic adjustment. It has even gone so far as to set up its own schools to educate its beginning employes. Professional educationists may well "view with alarm" this tendency of industry to commercialize education, but they will also do well to study the efficient methods by means of which industrial education strives to accomplish its specific ends.

One of the contributions of industry to education is the technique of job analysis. This method reached a high plane of educational development nearly thirty years ago when Mr. John S. Leech employed it in the education of native children in the Philippine Islands. That work, which apparently attracted little attention, revealed tremendous promise as an analytical system of specific education. Mr. Leech analyzed the printing trade into its various departments, its particular jobs, and its specific unit operations. On the basis of this analysis he organized a system of vocational education, the effectiveness of which was the crucial proof of its value and possibilities. We applied Mr. Leech's method with good results in 1920 in the vocational industries of the New Jersey State Prison and the New Jersey Reformatory. Unfortunately these results were not published except in descriptive form, but their value, amply justified the method of approach. This same method is now being applied as a scientific approach to the problems of industrial education of the feeble minded at the Training School at Vineland. A complete industrial and vocational survey of all occupational training assignments at the Training School has been planned. The first of these studies is reported herewith as an illustration of the method's values and principles. We believe we are justified in the conclusion that this same method can be applied with equal if not greater success in the education of normal children not in institutions, and we even venture to predict that some modification of this procedure will be evident in the public education of the future. Mr. Bobbitt's endeavor in this direction has already created a furor in educational circles. Although Mr. Bobbitt has not paid as much atten-

<sup>1</sup>Bobbitt, Franklin, "The Curriculum," New York, Houghton, Mifflin Company, 1918; "How to Make a Curriculum," New York, The Macmillan Company, 1924; "Curriculum Investigations," Supplementary Educational Monographs No. 31, Department of Education, University of Chicago, 1926.

tion to educational values as he might well have done, that defect is a detail which can be corrected by further work in the field.

#### Principles of Job Analysis

In the industrial world job analysis is chiefly used as a method of industrial efficiency and industrial placement. The ultimate purpose of the analysis is to reveal the requirements of the specific unit operations in order that men may be selected for the work with a minimum of industrial turnover, a reduction in the period of "breaking in," and a more efficient production. An analysis has a number of definite steps according to the complexity of the administrative organization of the industry. In a large organization it is first advisable to analyze the industry as to its major departments, then as to its specific shops or subdepartments, and finally as to the jobs or the specific operations. The jobs are further analyzed as to their unit operations, and these unit operations are then analyzed if possible into their specific processes.

For example, in a large printing industry there will be a business department, a sales department, and a production department. Each of these departments will be divided into shops or subdepartments. Thus the production department will have a composing room, a press room, a bindery, and so on. In each of these shops or subdepartments there will be specific jobs. Thus, in the composing room there will be the job of linotype operator, hand-compositor, and so on. Likewise each of these jobs will have its unit operations. Thus, the hand-compositor must read copy, must set type, must throw type, and so on. And in each of these unit operations there are a number of specific processes such as motor co-ordination, form perceptions, memory processes, attention and the like. Thus in the unit operation of throwing type the operative must read the type, must recollect the pockets of the cases, must make certain co-ordinations in picking and throwing type, and so on.

The ultimate assumption of job analysis is that in the processes of industrial selection, i.e., employing a man for a specific job, it is possible to interview him, or to examine him, or to observe him in action, with respect to the specific unit operations. Under a system of micromotion study it is even possible to analyze the specific movement

processes involved in performing the unit operation into their component elements. The job analysis may lead to industrial reorganization in the interests of commercial efficiency without reference to industrial education of the operative, although usually, of course, complete job analysis results in some modification of the operative's performance.

From the point of view of the industrial psychologist job analysis should be paralleled by a corresponding man analysis. For the psychologist a unit operation and process may involve intelligence and personality as well as motor skill. Some tasks require care and judgment while others involve only perfunctory routine. Some tasks require variability in performance while others require monotony. Some require honesty, discreetness, or conscientiousness, while other jobs are independent of these traits. Complete psychological job analysis therefore involves more than an analysis of motor co-ordinations; it requires a study of the intellectual, educational, emotional, and other processes as well. In complete industrial selection, therefore, the candidate for the job must be examined in all these respects as well as with reference to his specific motor skill or industrial competence in the narrow sense.

The educationist is perhaps uninterested in job analysis as a method of industrial organization and placement. For him job analysis immediately suggests educational possibilities. For him the unit operations represent specifications to be met in the educational development of the individual and at once he devises a system of education or training designed to bring about the highest possible performance in the required tasks by an individual having previously no skill or less skill. This immediately becomes a field of operation for the industrial instructor whose business it may be to train young operatives in the most efficient performance of their duties after the industrial personnel officer has selected novices who give promise of becoming successful operatives.

It is safe to assume that specific industrial education should be left to the specific industry. Industrial education in this sense is not a function of public education. The instruction is often so specific to the particular industry and the variety of industrial methods from one organization to another so great that industrial re-education is frequently necessary for the operative who transfers

from one organization to another. With the increasing specialization of industrial life we find employers frankly preferring to break in operatives in training methods under their own conditions. These employers ask all public schools to train in the more general industrial virtues, and the more general non-specific processes underlying industrial operations. We therefore find the public schools emphasizing the broader lines of trade training which give a man that general preparation for economic adaptation which will provide breadth of industrial outlook and such a measure of cultural education as is his right as a prospective citizen.

#### Job Analysis of an Institutional Dairy

To illustrate the above principles of job analysis, to justify the suggestion that such analysis may be used as an educational method, and to promote the idea of an institution as an educational laboratory, we now present a concrete study of a job analysis of dairyman training in an institution for the feeble minded.<sup>2</sup> The dairy is a subdepartment of the farm in this institution. Children are placed in it sometimes as an industrial assignment, sometimes for industrial training, and sometimes for general educational purposes. Obviously it is necessary, before differentiating these assignments as to purpose, to have some objective for the individual so assigned. This is determined by the fact that some of our children may expect to remain in the institution during the rest of their lives and that after they have outgrown the training period it is justifiable, in the interest of economy and their own happiness, to place them in an occupation which may be considered a lifetime job, just as every adult sooner or later settles down to an occupation in which he expects to spend the rest of his working days. In this same dairy we have other boys who may not be expected to remain in this institution during the rest of their lifetime. They have a prospect of release or parole which would apparently be increased materially if they were trained in this occupation. These boys are assigned to our dairy for a limited period, but with an industrial objective, which is not necessarily to be attained in this dairy but perhaps in some other. It is obviously necessary, therefore, to give this class of boys an opportunity to go through all de-

<sup>2</sup>The investigational portion of this study was conducted by Miss Sue B. Stryker, Research Fellow, The Training School at Vineland, N. J.