

IMPROVING INDUSTRIAL ARTS TEACHING
THROUGH JOB ANALYSIS

By

JOE WALTON LEMLEY

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Northeastern State College

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REPORT APPROVED:

C. L. Hill

Report Adviser and Acting Head,
School of Industrial Arts Education
and Engineering Shopwork

L. H. Bengtson

Assistant Professor,
School of Industrial Arts Education
and Engineering Shopwork

Edmund R. Hapley

D. B. M. Zentgraf

Dean of the Graduate School

346768

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CHAPTER I

PRELIMINARY STATEMENTS

The factors that surround even the simplest job of the industrial arts teacher are many and varied, and comparatively small progress toward improvement will be made if the job is studied as a whole. Therefore, the first step in the study of any job is to make a thorough analysis by resolving it into its component parts or elements. Each part or element may then be considered separately, and the study of the job thus becomes a series of fairly simple problems.

Reasons for Making Study. Industrial Arts is a relatively new and rapidly expanding field in education.

The writer feels that the need for improved instruction in the Industrial Arts Shops of Oklahoma is more sorely needed at this time than any other one thing. It is the writer's opinion that the employment of job analysis in teaching will help bring about a marked degree of the needed improvement.

The industrial arts teacher has one job, that of teaching the course of study in such a manner as to facilitate as many new educational experiences as his abilities will permit.

Each year many new teachers enter the teaching field of industrial arts. Some of these teachers have little or no conception of the things industrial arts strives to accomplish.

It is the purpose of this study to present to all industrial arts students, as well as teachers, the views of qualified teachers throughout the state of Oklahoma, as revealed

through a questionnaire, and certain data obtained through library research.

Definition of Terms. The following definitions are given for the purpose of giving the reader a better understanding of this problem. Adequate bibliographical reference is made where the definitions have been found in publications.

Industrial Arts. Is one of the Practical Arts, a form of general or non-vocational educational education which provides learners with experiences, understandings, and appreciations of materials, tools, processes, products, and of vocational conditions and requirements incident generally to the manufacturing and mechanical industries. (16, page 27)

A Position. Is a group of tasks performed by one person. There are always as many positions as there are workers in a plant or office. (12, page 11)

A Job. Is a group of similar positions in a single plant, business establishment, educational institution or other organization. There may be only one or there may be many persons employed in the same job. (12, page 11)

A Job. Is anything that a man is paid for doing. (1, page 366)

An Occupation. Is a group of similar jobs found in several establishments. (12, page 11)

Job Analysis. Is defined as the process of determining, by observation and study, and reporting pertinent information relating to the nature of a specific job. It is the determination of the tasks which comprise the job and of the skills, knowledges, abilities, and responsibilities required of the worker for successful performance and which differentiate the job from all others. (15, page 1)

Analysis. Listing out all the things that the learner must be taught if he is to be taught the complete trade. (1, page 365)

Teacher-Pupil Ratio. Teacher-pupil ratio can be defined as the given number of students who are under the direction or instruction of one teacher or instructor for a given class period.

Teacher-Pupil Planning. Teacher-pupil planning may be defined as the act of a teacher and the pupils planning together the educational experiences that are desired for a given course of study.

Limitations of the Study. The scope of applicable material concerning the study is small. It is imperative that the study be made through contact with teachers in the field of industrial arts, who have had experience in the analysis of jobs pertinent to the study. A large proportion of the material obtained through library research, dealt almost entirely with job analysis as applicable to industry. This material must be analyzed in order to establish a critical viewpoint concerning job analysis in industrial arts.

Methods of Securing Data in This Study. In developing this study, a questionnaire was prepared and a letter, explaining the topic for investigation and urging cooperation from those teachers qualified to reply, was transmitted with the questionnaire. This information, direct from the respondents, was supplemented by reference books, texts, periodicals, bulletins, manuals, and other publications. The questionnaire and the supplementary material compiled through research constitute the basic materials of the study.

In the following chapter is presented the introduction and short history of job analysis. The early history of job analysis is reviewed, and it's gradual development in industry is discussed.

The writer was unable to find through library research, any reference devoted entirely to the history of job analysis.

Most of the history is recent, and deals with job analysis as developed during World War II. The Division of Occupational Analysis, has published more historical information on job analysis than has any other individual, group, or organization.

The extent to which job analysis is presently employed in teaching industrial arts, probably will not exceed a general mental analysis. It is the sincere hope of the writer that industrial arts teachers, by reading the foregoing history and development of job analysis in American Industry, can appreciate the tremendous improvement it has undoubtedly made possible in industrial production; and at the same time, see the need, and importance of job analysis in teaching technical courses in industrial arts.

CHAPTER II

THE HISTORY OF JOB ANALYSIS

The method of job analysis is relatively new and its early history is limited. Most of the job analysis methods in use today developed from the methods study, frequently referred to as time and motion study. Although methods study and job analysis are very similar in nature, they should always be differentiated by name. Job analysis was not deemed significant as a means for obtaining occupational information until after the Industrial Revolution made essential the need for some method of obtaining all the information concerning a job and its surroundings.

Early Development of Job Analysis in America. Frederick W. Taylor is given the credit for originating the first method of "Scientific Management". In 1903, Taylor's publication on "Shop Management" introduced to the American Society of Mechanical Engineers a new era in progressive practices and management. Most of the practices described by Taylor were well known before he introduced them in a formal manner. The work of Taylor made great advance in the methods used for recording information for the purpose of analyzing the activities of various operations. (13, page 3)

Many new and better methods of obtaining complete occupational information were developed due to the new concepts expounded by Taylor. Taylor advocated progressive practices in management, and developed the practices around job performance

and wage rates. Taylor saw the need for a method for determining the proper way to do jobs and the specific amount of time to allow for their performance. This was made possible when he developed time and motion studies as a means for conserving effort and saving time. The plan for wage incentive came out of the time and motion studies, and later job analysis was developed as a method of securing and recording the facts about jobs and operational methods. Through the use of job analyses, job descriptions and job specifications were made possible in written form. This was the first basis for applying measurement and doing away with personal judgment in determining what jobs were worth. The unreasonable difference in wage rates for related jobs were established, and resulted in the use of job analyses by the management as a basis for determining the relative values of various jobs. (13, page 3)

Job analysis progressed slowly for many years, likely because industry did not require the use of it as it does at the present. With the rapid increase in industrial production, the adoption of job analysis was due to the dire need of securing a wide range of detailed information about the jobs that workers actually performed.

Federal Development of Job Analysis. The seventy-third congress passed the Wagner-Peyser Act in June of 1933. This act revitalized the United States Employment Service. The primary purpose of the Wagner-Peyser Act was to put into operation a system of employment offices on a nation-wide basis. In 1934, a systematic program of occupational research was

organized. This organization branched off into several fields of occupational information methods, bringing about the extensive use of job analysis in industrial jobs. These different phases of job analysis are used by industry, governmental and private agencies, and employ organizations for many programs ranging from broad types of activities, such as personnel and placement, to very specific ones, such as defining the limits of authority.

Financial Support of the Occupational Research Program.

The three sources of financial support for the occupational research program were endowments from the Spelman Fund and the Carnegie Corporation. These two sources of funds together with a Federal appropriation were the primary sources of financial assistance in establishing the Occupational Research Program. This program was a part of the United States Employment Service which was under the direction of William H. Steed. A Technical Advisory Board was formed at the same time for the purpose of advising and assisting in coordinating of activities of occupational analysis, especially, in industry, education and related activities. The purpose of the Technical Advisory Board was primarily to keep the analysis program abreast with the changing trends in these activities. (4, page 2)

Gradual Growth of the Occupational Research Program. The first year of the Occupational Research Program, or the ORP, as the early program was referred to, marked the beginning of a trial job analysis technique. This technique was used in analyzing the cotton textile, petroleum, and automobile

industries.

Fifteen research centers were established throughout the United States in 1935. Cooperating jointly with the State Employment Services in developing and applying occupational analysis material, the Occupational Research Program advanced the study of aptitudes and skills.

In 1938, community research centers were established, and were to be jointly maintained by the Employment Service and the American Youth Commission. In order to locate an outlet for applying the results of the research, cooperative relationships were established with groups who were interested in the movement as applicable to local problems.

In 1940, the Dictionary of Occupational Titles was released. This phase of integration made the Occupational Research Program more popular than it had ever been since its inception in the Department of Labor. Intensive and organized training was given to the office personnel in the local research centers. The method of job analysis was learned, and the use of the products of occupational research.

Occupational analysis was typified during World War II by Manpower Utilization. It was during this period, that government agencies and employers in private industry made use of the results of occupational analyses for the purpose of solving manpower problems. Special emphasis was placed on upgrading, job subdivision, absenteeism and labor turnover, employment of women, and designating essential and critical occupations. The

military and civilian specialties in occupational analysis, cooperated in the necessary interviewing and placement of World War II veterans in 1943 and 1944. This relationship led to new testing and devices for selection and placement of ex-military personnel. Requirements caused by the post-war period put special emphasis on the application of occupational analysis products to make it possible for local offices of the State Employment Services to serve the needs of workers more fully, as well as employers and their respective communities. (4, page 3)

Transferring of the Program. From 1934 until 1939, the Occupational Research Program was carried on as a part of the United States Employment Service, under the direction of Dr. William H. Stead. The President's Reorganization Plan provided for the transfer of all the activities of the Employment Service to the Social Security Board. It was then carried on in the Occupational Analysis Section of the United States Employment Service Division, Bureau of Employment Security. Dr. Carroll L. Shartle became chief, and did an excellent job of filling the post until October of 1944.

The program was conducted as the Division of Occupational Analysis and Manning Tables from February 1943 until September 1945. It later became known as the Division of Occupational Analysis, Bureau of Manpower Utilization, War Manpower Commission.

September 19, 1945, an Executive Order transferred the

United States Employment Service from the liquidating War Manpower Commission to the United States Department of Labor. Since then the Occupational Analysis Program has functioned as the Occupational Analysis and Industrial Services Division, United States Employment Service, United States Department of Labor.

Nine major occupational research activities have been evolved by the Occupational Analysis and Industrial Services Division. The basic one of these is the analyses of jobs. The Division has secured its source of material for the past thirteen years as the result of approximately 100,000 separate job analyses. (4, page 5)

One of the best examples of the results of job analysis in modern trends, is that of the industrial role played by the United States during World War II. The mass production was made possible to a large extent through the use of job analysis. Job analysis met the need for selecting workers qualified to carry on, or to learn readily, specific jobs in which manpower was needed.

CHAPTER III

IMPROVED INSTRUCTION IN INDUSTRIAL ARTS THROUGH JOB ANALYSIS

It is the current belief of the writer that a satisfactory job analysis program can be put into operation in the industrial arts shops in the junior and senior high schools. Many of the industrial arts teachers have little or no conception of the meaning of job analysis. It is imperative that these teachers become acquainted with the method of job analysis. If effective teaching is to occur, it will occur after job analysis has acquainted the students with the proper method of acquiring the desired knowledge.

Instructional Procedure. A detailed analysis of the various operations or the facts or principles that comprise the unit to be taught is essential for successful teaching.

Let us assume that a basic demonstration on the use of the marking gauge is planned for a ninth-grade woodworking class. Obviously the teacher will expect to present in proper order all the necessary tool operations as well as a logical order of facts that must be kept in mind when learning these operations and in applying them. But before he can list the instructional procedure for his lesson, he must have determined just what it is that is necessary for the learner to know and to be able to do in order to accomplish the aim of the teaching presentation. This he does by analyzing the desired procedure.
(6, page 66)

It will be noticed that Ericson's analysis did not mention the techniques or working procedures for the final achievement of the steps which are indicated. The students are merely

being informed on accepted practices. The procedures can be taught in an organized teaching plan.

The Purpose of Job Analysis

Job analysis is an intense and direct method for securing the essential facts about jobs. The job must be observed and the facts reported that are obtained through observation and conversation. Many such facts can be directly obtained from workers, supervisors, and others who have information of value concerning the job. There are several methods for obtaining occupational information, but job analysis is the most widely accepted method in use. It is of immeasurable value to both military and civilian government in dealing with large numbers of workers.

Recruitment and Placement. Job analysis is used extensively in determining the requirements and specific qualities required of workers to fill different jobs. Job analysis serves as a guide for the recruitment and placement of personnel in jobs which they are mentally, physically, and emotionally capable of performing. Definite objectives must be the determining factor in the recruitment and placement of personnel. If the detailed facts about the job are known, then a worker can be found who will possess the requirements essential for the best performance of the job. When the placement of personnel is dependent on interviewing, it is a matter of chance as to whether the right man for the job has been selected. The use of job analysis eliminates the chance of recruiting and placing of incompetent personnel.

Vocational Counseling. Job analysis provides those persons in the field of vocational counseling with accurate data of the tasks and the requirements an individual must have in order to successfully perform a particular job. The solving of problems confronting the worker can be accomplished through the application of occupational adjustment. Occupational adjustment can be achieved only when the nature of the occupation is established and well known. The exact nature of an occupation is established when job analysis is used. In vocational counseling, job analysis is a basis for advising youth, physically handicapped, and inexperienced personnel. (15, page 2)

Job and Employee Evaluation. Job analysis is used in private industry to obtain occupational data which is essential in evaluating the performance of employees on the job. It shows the relationship of the qualifications and abilities possessed by the worker to the factors surrounding the job, this makes possible an evaluation of the performance and the employee on an objective basis. Without objective measures, it is impossible to make an accurate evaluation of the degree of skill possessed by a worker. Objective evaluation of jobs establishes an impartial basis for salary and wage rates, and enables the management to maintain control and economical operation. Only job analysis can provide the data needed for the careful analysis of the degree of skill and difficulty of the job. (11, page 31)

Training. If a thorough job of training is accomplished, it must be accomplished through the use of the detailed information concerning the job for which individuals are being trained. The dependency of a training program on job analysis is great. Before an individual can be trained to skillfully perform a particular job, the nature, duties, responsibilities, and similiar factors which comprise the job must be known. The development of the curriculum, the establishment of time required for training, and the selection of trainee personnel depend almost wholly on a detailed analysis of the job for which the training is being done.

Better Utilization of Workers. Job analysis is the essence of efficient industrial management. The information it supplies concerning the nature of every job in the organization, establishes a basis for objective organizing. The reengineering of methods of procedure. This makes possible a higher degree of personnel utilization through the elimination of poor work procedures or repetitious effort. (15, page 3)

Safety, Health, and Medical Research. Industrial safety programs depend on job analysis to locate existing sources of occupational hazards and to serve as a basis for developing safety procedures for eliminating such hazards. By analyzing the conditions under which the job is performed, conditions causing accidents are alienated and remedial actions can then be applied. Physical diseases, over-fatigue, and mental weariness can often times be linked directly with the nature of a job and its surroundings. The provision of occupational

data, by job analysis, concerning physical requirements, provides medical departments with information necessary in making decisions regarding handicapped workers. Obtaining the specific requirements of the worker for a particular job, enables medical departments to decide whether or not an employee with certain physical limitations can successfully perform the duties of the job. (15, page 3)

Labor Relations; Within-Plant Personnel Policies. A mutual understanding between the workers and the management of any organization is essential. Job analysis helps to achieve this understanding by clearly defining the nature, scope, duties, and responsibilities of each job in an organization. Job promotions are based on occupational data obtained through job analysis. Good morale is maintained by the limits placed on authority by certain data. Industrial management has recognized the significant importance of job analysis in maintaining orderly and economic operation. Industrial workers have accepted the method of job analysis because it specifies exactly "What they are to do", "How they are to do it", "Why they are to do it", and the "Skills they must possess to do it". The success of any job analysis program depends on the purpose of use, completeness, and accuracy of the information obtained. (15, page 3)

Locates Sources of Workers. The locating and placing of experienced workers in new jobs or existing vacancies is a constant duty of the placement officer. There are special job analysis schedules prepared for this phase of management. The

schedule is made to indicate the sources of workers for the job analyzed. These workers are ready to employ, as they are already qualified for the job. The schedule also points out the necessary experience and training that a worker applying for the job must possess. The job analysis schedule is used by the vocational counselor in placing inexperienced persons, and in transferring workers from a job in which they are experienced to another type of work. (15, page 18)

Identification Data. The identification data is a source of information which concisely identifies all of those things which comprise the job. The information is necessary in order that the employer know what the job is, who the worker is, and the allocation of the job. This information serves as a check on performance and a source of improving worker-management relations.

Establishes Job Titles. Job analysis establishes a fitting title or alternate title for all jobs. It is the title that the employer will know the job by, and usually the worker. In some instances inappropriate names will be given to jobs, but they should not be changed on the analysis. All the circumstances concerning that particular job depends on the job title. (12, page 18)

Establishes Job Relations. Job relations are established when jobs are analyzed. The relation shows any similarity existing concerning the job analyzed and other jobs. Knowing the relationship of one job to that of another provides for an

objective method of promoting and transferring workers from that job to a similar job. When a job is analyzed and found to be comparable with another, it may be classified as transferable; providing the worker on the other job can successfully perform it. Only job analysis can supply the necessary information for accurately showing the true relationship of jobs. (12, page 21)

Specification of Duties. Job analysis provides the worker and management with the exact duties of the job. It is helpful to the worker because the only things required by the job are specifically and concisely stated. It enriches management by aiding in the selection of qualified personnel, and the transferring of within-plant personnel.

Performance Requirements. Performance requirements consists of those things a worker must be able to do in order to successfully perform a job. Job analysis provides the requirements for performance along with the degree of skill involved in performing each requirement. The importance of this occupational data is significant from the standpoint of enabling management to select the right employee for the right job.

Specifies Required Experience. Job analysis provides clear and concise data on the experience and necessary training required of individuals who are selected or are applying for a job. This informational data is essential in employing individuals who are known to have experience in the performing of the job analyzed. Vocational counselors make use of this phase of job analysis in the placement of trained, but inex-

perienced persons. The time saved by the use of experience data in employing personnel is well worth the expense incurred in its preparation. (12, page 22)

Worker Responsibilities. The clear statements of responsibilities provided by job analysis establishes the nature of the job and its precise limits. These objective statements are valuable in adjusting grievances and misunderstanding among the workers and even the management. These responsibilities definitely establishes where the job begins and where it ends. This fact gives the worker a feeling of independence and security and the knowledge that he will not be required to do work beyond the limits of his job.

Measures Job Knowledge. Job knowledge refers to the practical understanding the workers have of equipment, materials, working procedures, techniques, and processes required for the successful performance of jobs. This knowledge consists of that which is required preceding employment and that which must be acquired after employment. Job knowledge must consist of all the knowledge required of the workers by the jobs. (12, page 20)

Degree of Mental Application Required. Mental application refers to the use of mental abilities and processes which the worker must be able to exercise in order to successfully perform the duties of the job. The degree of mental application is largely determined by the results of the kind and length, or continuity of thought involved in the performance of an operation. The quality and economical production of industry depends

to a great extent on the mental application exercised by its employees. Industrial management attempts to employ those persons who have initiative, adaptability, judgment, and mental alertness. (15, page 29)

Dexterity and Accuracy. Job analysis stipulates the manipulative abilities required of the worker to successfully perform the job with the required degree of accuracy. Information regarding dexterity and accuracy is essential in determining whether or not a worker can properly manipulate tools, instruments, gages, and process material. This plays an important part in the safety program, as well as promoting orderly and economic operation.

Defines Technical Terms. All technical terms concerning a job are clearly and concisely defined. The definitions usually explain what the term is, how it is used, and what it is used for. This information is extremely important from the standpoint of job knowledge. If the worker knows the term by another name, then the definition of the technical term is necessary in order that he may be able to understand to what the term refers.

Physical Demands. The physical activities, demands, and limitations of workers are always determined by job analysis. All jobs require certain physical standards that must be met in order to facilitate the highest, most economical, and orderly production. The analysis of the physical demands of jobs supplies the vocational counselor with important information

for job placements. It also provides good advise to the physically handicapped or dis-abled workers. The physical demands may lead to the most rigid type of investigation of the job. This sometimes results in the discovery that a dis-abled or handicapped person can actually perform the job with successful results.

Physical Activities. The physical activities required in the performing of a job are established when the physical demands are analyzed. Physical activities and physical demands are very closely related. Physical activities are the various movements or efforts exerted by the worker while actually performing the duties of the job. A detail of the physical activities is worked out showing the frequency and intensity factors of the activities. The study of this detail of physical activities results in the finding of the percentage of time spent in doing each specific duty. The intensity of the physical activity refers to the energy consuming factor.

Details of Hazards. Job analysis makes it possible to locate potential hazards which may exist in a job or its surroundings. A worker is exposed to the particular hazard which accompanies his particular job. It may be cuts, bruises, lacerations, fractures, burns, hernia, loss of parts, sprains, impairment of sight or hearing, occupational disease, electric shock, or collapse. The degree of such an injury is never expressed, only the length of time the worker is subject to such injury. A thorough study of the time a worker is subject to injury will eventually establish an estimated degree of possible

injury while performing the duty. (15, page 41)

Working Conditions. Many working conditions are present in any job or its surroundings. The working conditions are stated when the job is analyzed and a check mark indicates if the condition is present or absent for that particular job. This information is another vital step in the burbin of occupational accidents. When the conditions are known, then remedial steps can be taken to improve those conditions which are undesirable or hazardous.

Establishes Workers Characteristics. Many jobs require certain characteristics which the person must possess to satisfactorily perform the job. These characteristics are used in evaluating jobs, determining transfers, and the selecting of personnel to perform jobs. Most of the characteristics are physical, and directly related to the duties which must be performed on the job. These characteristics are especially important from the standpoint of selecting personnel for jobs which require, physical strength, coordination, dexterity, and the rapidity, complexity, and frequency of movements.

(15, page 44)

All of the foregoing purposes of job analysis have many details attached which places them on a very objective basis. The objectivity of job analysis marks its degree of validity. No details are too small to be considered as a possible means of improving the job. Job analysis has one basic purpose, that of securing all the information about a job. No other method of obtaining occupational information is known to surpass the

degree of accuracy with which job analysis is credited.

The rapid expansion of industrial arts in Oklahoma Junior and Senior High Schools is creating a great demand for teacher-pupil planning in the various courses of study being taught. Job analysis and teacher-pupil planning can be correlated. Job analysis not only defines the nature of the required skills one must possess to do a job, but will help locate physical weaknesses of the students. Here is the opportunity for the industrial arts teacher and the student to plan together on a more passive element of the job.

General Divisions of Job Analysis

In the Training and Reference Manual for Job Analysis, the War Manpower Commission defines job analysis as:

....The process of determining, by observation and study, and reporting pertinent information relating to the nature of a specific job. It is the determination of the tasks which comprise the job and of the skills, knowledges, abilities, and responsibilities required of the worker for successful performance and which differentiate the job from all others. (15, page 1)

Briefly, the general divisions of job analysis covers the field of occupations variously known as the skill involved in the performance, naming, defining, and classifying jobs, the establishment of occupational families, determining the physical demands of jobs, the describing of jobs, industry composition study, developing and using measures of skill, and the measurement of occupational aptitudes. (4, page 5)

Values of Job Analysis. Although concerned primarily with the functions of American Industry, the values of job analysis can be applied to any human activity. No job is so complicated or perplexing that a normal individual cannot make a satisfactory analysis or adjustment, if he so desires, so long as normal life conditions prevail.

The value of fitting into American Society as a worthy citizen is not to be overlooked. Again job analysis is not to be overlooked as a means of meeting the needs of making a place in society for individuals. It is imperative that a self-analysis be made of ones character, personality, and traits if socially-acceptable points are to be improved upon. This may be a mental analysis and its success depends entirely upon whether or not the individual desires to become a better citizen. Every individual makes a mental analysis of the various activities which comprise their daily life. It is a human attribute and endowment possessed by every normal human being. If God endowed the human race with this mental process, then surely it can be applied to every job for a general improvement of those things performed for the purpose of maintaining and adequate livelihood.

Personal experience is the natural evidence to which man first turns in the search for truth. When confronted with a complex job or operation. Man immediately searches his past experiences for a like situation. If such a precedent has been established, he will apply the previous methods of operation in order to perform the job. If he has never experienced a like

job or operation, he must become acquainted with the acceptable practices for performing the particular skill and taught the techniques and procedures for completing the job. The values of safety can easily be detected in such an analysis and is one of the reasons for making the analysis. Safety depends on job analysis to specify by name existing sources of job hazards. Here as in all fields in which job analysis is used, an analysis of working conditions is necessary for remedial action.

General Objectives. Today, more than ever, leaders in government, business and labor are working together in order to try and establish a satisfactory medium that will prove adequate for a mutual understanding concerning labor and wage problems. The method of job analysis is being used more and more as a means of formulating the procedures needed to determine reasonable job rates.

One objective is to establish impartial judgment, and specify by name an accurate and logical relationship of each job to the others within the organization and to establish the difference in wage rates with known differences in jobs. The procedures needed for the accomplishment of the objective is specified by job analysis. Within-plant personnel policies are suggested by the War Manpower Commission, in the Training and Reference Manual for Job Analysis. (15, page 3)

A second objective of job analysis is to select employees with greater effectiveness and provide an impartial method for training, promoting or transferring them within the organization.

The analysis of the various jobs within a given organization provides the management with the needed procedures for this objective.

A third objective is to promote good will among the employees. Industry has found that this helps strengthen and maintain morale and loyalty of the worker for the organization in which he works. It also provides for efficiency of work performance, increased production, and the need for less rigid supervision.

A fourth objective is to provide management with a fundamental basis for the proper control of the organization, the elimination of favoritism, minimizing the waste of time and materials through proper assignment, and the recognition of skills and responsibilities. It helps to eliminate the potential hazards to which workers are constantly subjected during the actual performance of duties, and increases the profits because of the efficiency and high standards of production.

The Need for Job Analysis in Industrial Arts

Job analysis has been discussed largely from the standpoint of industry. This is understood because of the greater need for job analysis in industry than in other agencies and organizations. It has previously been stated that the adoption or use of job analysis will usually occur when the need is felt for such a method. The need is being felt by a majority of the industrial arts teachers, but unfortunately they possess a limited amount of knowledge about the method of job analysis.

If one of the objectives of industrial arts is to acquaint and make familiar to the students as many phases, techniques, operations and tool processes in industry, as the facilities of the shop will permit; then it should be agreed that job analysis is a precision tool of American Industry and should be put into operation in the junior and senior high school industrial arts shops.

An Analysis for the Job of Teaching Woodworking. Job analysis is the essence of efficiency. Any job, occupation, task, or activity can be analyzed. The analysis of a job provides the basis for job reorganization by giving clear and concise pictures of specific jobs and pointing out the new adjustments needed for more efficient work. The clear statements of duties and responsibilities provided by job analysis are of the utmost importance in training personnel for specific jobs. The analysis of a job is significant from the standpoint of measuring the degree of difficulty of the tasks and precisely defining the nature of the required skills in order to indicate their difficulty.

When definite aims and objectives have been established for a class in woodworking, then the analysis of the job of teaching the class should be made in order to best achieve the objectives. All the teaching plans and steps of procedure can be definitely stated if the teacher knows just what it is that the job requires. The teacher needs to know the exact duties or tasks that comprise the job of teaching woodworking. A job analysis schedule will provide this data with other job or

occupational data.

A proposed job analysis schedule for the job of teaching woodworking has been prepared in order to make woodworking teachers more fully aware of the various component elements which comprise the teaching job.

A PROPOSED ANALYSIS OF THE JOB OF THE WOODWORKING TEACHER

- A. The proper title of the job is teacher of woodworking.
- B. Alternate titles, or other titles by which the job may be known, are teacher of shop, teacher of woodwork, shop teacher, and woodwork teacher.
- C. The materials involved with the job are various woods and allied materials used in working with woods.
- D. The department to which woodworking is directly related, is the Industrial Arts Department.
- E. The Department Branch is the woodworking shop.
- F. Duties Performed. The teacher develops in boys, desirable characteristics, qualities, manipulative skills, and a general knowledge in the art of woodworking. The development of aesthetic appreciations must not be overlooked as one of the general duties of the woodworking teacher. The nature of the job of teaching woodworking, makes it impossible to alienate all of the general duties of the teacher. Many of the duties confronting the woodworking teacher are not physical in nature, and therefore, makes it necessary for each teacher to make a mental analysis of these duties as to value concerning the immediate lesson plan. It is, however, possible to list specific duties that are physical in nature. The following

list of duties are among the most common that are performed by the average teacher of woodworking.

1. Alphabetizes students names in the record book.
2. Develops various charts for instructional purposes.
3. Prepares for, and gives class demonstrations on the uses of all available woodworking tools.
4. Makes equipment inventory, and fills in purchasing orders and orders the needed tools, equipment, and supplies.
5. Makes occasional phone calls in connection with the teaching job.
6. Sponsors an occasional assembly program with woodwork-
ing students.
7. Builds lockers, cabinets, tool boards, tool holders,
and other needed facilities for the shop.
8. Carries, lifts, and cares for tools, equipment, and
materials.
9. Frequently makes working drawings to scale of projects
to be made in the shop.
10. Develops, administers, and checks tests.
11. Mixes glues, wood fillers, and finishing materials.
12. Sharpens plane irons, wood chisels, gouges, lathe
tools, hand saws, and other woodworking tools that may
be available.
13. Occasionally sets hand saws and circular saws.
14. Disassembles spray guns, cleans, adjusts, and demon-
strates the proper use of each.

15. Occasionally builds, or assists in building facilities for the administration of other departments.
16. Operates and demonstrates the proper and safe methods of operating power machines.
17. Supervises the cleaning of the shop, oiling of machines, and the restoration of tools to their respective places.
18. Gives individual supervision when and where it is needed.
19. Records the grades of students on report cards, and collects the cards again after they have been signed by the parents.
20. Writes and draws extensively on the blackboard during instructional periods.
21. Reads related material and keeps up with the latest trends in woodworking.
22. Works with students in analyzing various woodworking projects in regard to values, techniques, processes, function and design.
23. Arranges tools, machines, work benches, and all other equipment in such a manner that the maximum area of the shop may be utilized for working space.
24. Gives safety instruction for the purpose of warding off, or reducing accidents.
25. Attends Industrial Arts Conferences and Clinics to further develop a fundamental knowledge of the profession of which he is a member.
26. Maintains proper control of students for safe and orderly working conditions.

G. Training and Experience Data. Various jobs require different amounts of training and experience. The job of teaching woodworking does not usually require any previous teaching experience. This will be determined largely by the qualification standards for teachers as established by various Boards of Education. If previous teaching experience is not required, an acceptable amount of training will be specified. Four years of college training, or the completion of a B. S. Degree, with a major in industrial arts are the present standards. In some instances a M. S. Degree may be required, depending on the educational institution in which the individual is to teach. An inexperienced teacher is one that has never before taught under a legal contract. An experienced teacher is one that has taught one or more years under a legal contract.

There are four types of training which the teacher of woodworking may acquire. The types of training are listed and defined as follows:

1. Pre-Service Training. This type of training is acquired before teaching. There are specific job skills acquired through this type of training, such as, the skill of properly operating the circular saw, band saw, jig saw, jointer, sanders, drill press, mortiser, and lathe. Skills in the manipulation of all the common hand tools are also acquired through this type of training. At the same time these skills are being acquired, a working knowledge of woods and the physical and chemical properties of the various kinds and

the respective uses and finishes for each, is also acquired.

2. In-Service Training. This is further training acquired through extension courses, correspondence courses, and summer work on the campus of the college or university. The specific job skills acquired through this type of training may be the same as those acquired through any one of the types of training. This training is usually acquired while the teacher is under a teaching contract.
3. Vocational Training. This type of training is acquired through courses taken at a school which specializes in Vocational Education. For example, a Technical Training School. The specific job skills acquired through this type of training are operative and manipulative in nature and are the same type of skills that are acquired through the other types of training.
4. Training in General Education. This training is acquired through academic courses taken by the teacher. The teacher who has acquired specific skills through this type of training, are adept in reading, writing, speaking, distinctive pronunciation, and arithmetic. Correct methods of making social contacts are also acquired through this type of training. A general knowledge of General Education and its values, are the objectives sought in taking this type of training.

H. Opportunity for Professional Advancement. This advancement is usually thought of as promotions, although, it could be a transfer to a higher or more dignified position in the industrial arts department. The woodworking teacher might be transferred to a supervisory position, where the duties to be performed would be entirely supervisory in nature. General supervision would probably be given, rather than close supervision.

I. Personal Requirements. The following data concerns performance requirements. Performance requirements are the things that the woodworking teacher must know and be able to do. The requirements are both physical and mental in nature. Whether an individual woodworking teacher is hired, or employed by the administration, or the Board of Education, this data should be considered before a binding contract is entered upon. This data should not be treated lightly since it is the basic principles involved in performing the teaching job.

1. Responsibility. The teacher must consider material and projects, safety of others, equipment or processes, cooperation with others, instruction of others, public contacts, and planning ability.

Details. The teacher is responsible for developing manipulative skills in students, and for motivation of creativeness, exploration, initiative steps, and cooperation among the students. The teacher must develop in students an aesthetic appreciation for good work and the resulting project. The teacher is direct-

ly responsible for the cleanliness, care, and operation of the shop and the facilities therein. The teacher is further responsible for devising safety methods for the protection of the students.

2. Job Knowledge. The employer must consider pre-employment and on-the-job knowledge of equipment, materials, working procedures, techniques and processes, as well as the academic training, and general education of the teacher.

Details. The teacher must have a knowledge of the physical and chemical properties of woods and of all the wood finishing materials used in the woodworking shop, as well as a working knowledge of algebra and arithmetic such as are used in figuring lumber bills, board feet, and price per board foot. The teacher must know the procedures and uses of all hand woodworking tools, power machines, and know the danger potentialities of each tool and machine. The teacher must also be acquainted with the various finishes for woods, and know the proper methods for applying them, and the sources of these various materials, facilities, and equipment.

3. Mental Application. The employer must consider the initiative, adaptability, independent judgment, and mental alertness of the teacher.

Details. The teacher must be alert and reliable, and be fully aware of the various physical and chemical

properties of the different kinds of woods. The teacher must exercise considerable ingenuity and adaptability in working with students; and must plan the activities of the students and supervise their tasks. The teacher must also be able to cope with any arising disciplinary problems and at the same time control his own emotions.

4. Dexterity and Accuracy. The considerations for dexterity and accuracy are precision, dexterity, accuracy, coordination, expertness, care, and deftness of manipulation, operation, or processing of materials, tools, instruments, or gages used.

Details. The teacher must be able to determine accurately the direction in which the grain of woods run, and must be able to operate power machines with a medium degree of accuracy. The teacher must also be able to measure accurately with all the measuring devices used, and be accurate enough in every thing in order to set a good example for the students.

J. Knowledge of Equipment, Materials and Supplies. Every woodworking teacher must have a specific knowledge concerning equipment, materials and supplies. All physical activities planned for the woodworking shop are based directly upon the available equipment and supplies. If woodworking teachers do not have a thorough knowledge of these things, then instruction cannot be facilitated to its best advantage. The following data gives the common equipment and allied materials of which

a woodworking teacher must have specific knowledges.

1. Equipment:

- a. Circular Saw. This is a power machine used for cutting stock to length and ripping stock to width. The blade is adjustable through an opening in the saw table. This saw is often equipped with a dado head for cutting dado joints in stock. For cutting stock to length the saw is equipped with a square head for square cutting. The head will also adjust to various degrees for cutting angles. A fence is used for ripping stock in order to facilitate accurate sawing and safety.
- b. Band Saw. A machine used for cutting medium curves in stock. It is merely a thin narrow saw blade made into a band which is pulled by an electric motor. The blade fits over an upper and lower wheel, with adjustments available for tension on the blade.
- c. Jointer. This is a machine used for securing a square face or edge on stock. The blades are secured in a rotary cylinder beneath the bed. The bed adjusts up or down to provide either a shallow or deep cut. This machine runs at a very high speed.
- d. Jig Saw. This is a machine similiar to the band saw, but used to cut smaller and inside curves. The blade is detachable, and can be inserted in a small hole for cutting inside designs. The blade is much more

fragile than that of the band saw.

- e. Sander. This is a machine used for sanding stock smooth. There are two common types, the disc sander and the belt sander.
- f. Drill Press. This is a machine used for drilling holes in stock. It is equipped with a chuck for holding drill bits, and a depth adjustment for boring to depth.
- g. Mortiser. This machine is similar to the drill press. It is equipped with a square cutting chisel for squaring up the hole that the inside bit cuts. It is used entirely for cutting mortises.
- h. Lathe. This is a machine used to turn wood. It is equipped with a head stock, tail stock, face plate, and other assemblies used in centering and securely holding the stock to be turned in place.
- i. Hand Tools. All of the tools that are used by hand for the purpose of tooling wood. Wood chisels, planes, screw drivers, try squares, rules, gouges, and the like.

2. Materials and Supplies:

These are the needed materials for holding together, finishing, and decorating of projects made of wood. Glue, screws, nails, wire brads, corrugated fasteners. Shellac, varnish, lacquer, sealer, enamel,

paint, linseed oil, wood filler, putty, undercoating, and stick shellac. Brushes, spray gun, brush keepers, alcohol, and many other materials that are essential in finishing the project.

3. General Comments:

Due to the hasty and careless tendencies of students, small hand tools, materials and supplies and other movable facilities may be misplaced. It is the duty of the teacher to see that everything is placed in its respective place at the end of each work period. It is especially important that the different finishing brushes be well cared for. It is highly possible that they will find a place in a different type of finishing material if the containers are not well marked. It is a desirable situation when the teacher successfully trains students to exert care in regard to all shop practices.

K. Physical Demands of the Job. The physical demands of the job of teaching woodworking are many and varied. The physical demands are not so much for physical strength as for common motor skills. The duties performed do not require a great amount of strenuous effort, but it is essential that the teacher be physically able to meet the demands if the teaching job is to be performed as it should be.

The teacher talks with students concerning daily assignments and transmits desirable procedures and processes. The teacher stands at the desk during instructional periods, and

walks among the students while they are working and discusses results of different techniques, processes, and designs. The teacher sits at a desk when filling in orders for supplies and equipment, and while recording student data or progress made.

The teacher usually works indoors in a well-lighted and adequately ventilated shop room, and the hazards existing in the shop or job surroundings are mechanical in nature. Most of the hazards existing in the woodworking shop are power machine hazards. These machines are the greatest potential hazards in the shop.

The following lists of physical activities and working conditions are closely related because the working conditions greatly effect the scope of physical activities.

1. Physical Activities. There are certain physical activities which the teacher of woodworking must be able to perform in order to facilitate the best type of instruction. The following list of physical activities are the common ones that the teacher must be able to do at various times while performing the duties of teaching woodworking.

Walking	Throwing
Jumping	Pushing
Climbing	Pulling
Standing	Handling
Turning	Fingering
Stooping	Feeling
Crouching	Talking
Kneeling	Hearing
Sitting	Seeing
Reaching	Color
Lifting	Speed
Carrying	Striking

2. Working Conditions. Every kind of job has different working conditions. The working conditions of a job are the physical factors surrounding the job. The following list of working conditions are some of the common ones surrounding the job of teaching woodworking.

Inside or Outside	Light or Dark
Dry or Wet	Ventilated or Stuffy
Dirty or Clean	Mechanical Hazards
Noise or Quiet	Working around others
Hot or Cold	Working with others

The analysis of the job of teaching woodworking is not as detailed as would be a specific job, such as, the job of a drill press operator, because of its scope and varied nature. It is not as objective in nature, but its importance is significant from the standpoint of informing the teacher what is to be done, how it is to be done, why it is to be done, and the skills involved in doing it. The foregoing job analysis schedule will help the woodworking teacher attack every day problems in a scientific way, and serve as a guide for further analyses of teacher activities. This job analysis schedule was prepared for the job of teaching woodworking because there are more industrial arts teachers teaching woodworking at the present time than any other one shop course.

In the foregoing chapter, job analysis has been discussed as applicable to industry. It has been the writer's aim to show a direct relationship between the improvement of American Industry and the improving of teaching in industrial arts by employing the method of job analysis. The purposes of job analysis, its values, and general objectives have been

discussed, and specific data of the various purposes of job analysis have been given and explained.

The need for job analysis in industrial arts has been pointed out and defended on the basis of improved instruction. By following the ideals and data concerning job analysis, a more desirable program can be offered to industrial arts students. As has been previously stated, job analysis can be taught and practiced in the shop, and will serve as an economical and orderly method for achieving the aims and objectives of various industrial arts courses.

CHAPTER IV

EXPLANATION AND DISCUSSION OF THE QUESTIONNAIRE

In undertaking a study of this nature, it was necessary to obtain information pertinent to the program of study. Obviously this information could be acquired only from those in possession of it, the industrial arts teachers. It was also expedient to have some concrete opinions as to the need of a job analysis program in the junior and senior high school industrial arts shops.

The only means of securing such information was through a personal interview or a detailed report. Since the former plan was not feasible, the questionnaire method was adopted.

PART A

The Basis for Selecting the Questionnaire

This inquiry was made as concise and brief as possible, to encourage a higher percentage of replies. Most of the questions were intentionally phrased so as to require only a check-mark on the yes-or-no answer. Some of the questions were not intended to be factual, but, were for the purpose of securing a distribution of opinions on several controversial points. Since it is the reliability of such an inquiry that makes it worthwhile, the number of questions were held to a minimum, to encourage acknowledgement by the recipients.

Distribution of Questionnaires. The mailing list was selected from the Directory of Teachers and Administrators of

Industrial Education Courses in Oklahoma Secondary Schools, Colleges, and Universities, the School of Industrial Arts Education and Engineering Shopwork, Oklahoma A & M College, Stillwater, Oklahoma, 1950-51, 19 pages. The list of representative recipients was selected according to the size of the school in which they taught. The location of each school was taken into consideration, in order to secure a better random sampling throughout the state. The form of inquiry was mailed on March 14, 1951.

Percentage of Returned Questionnaires. A total of two hundred questionnaires were mailed. The largest number of replies was received on the sixth day following the date of mailing. At the end of three weeks, the total number of answers amounted to ninety-seven, which was slightly less than 49 per cent of the total number mailed. Ten days following the date of mailing, a follow-up postal card was mailed to each recipient who had not yet answered. From the group of teachers who received the follow-up card, eleven answers were received by the end of the first week, making a total of one hundred eight replies, or a 54 per cent response. Three additional responses were received each day for the following three days, making a total of one hundred seventeen responses, or a 58.5 per cent return. Six incompleated questionnaires were received from teachers who no longer teach in the State of Oklahoma. These six recipients stated that since the study was being made in the junior and senior high schools of Oklahoma, they did not feel that the information they would give would be applicable to the

study. Although the six incompletd questionnaires rendered nothing toward the results of the study, they increased the number of acknowledgements to a total of one hundred twenty-three, or 61.5 per cent response.

Nature of Responses. The teachers who responded were most thorough and conscientious in completing the inquiry. Although the inquiry was made as brief as practicable, considerable time and thought were required in answering the questions that required concrete opinions. For the many voluntary comments concerning the study much appreciation is due.

For example, one respondent volunteered the information that a course in home mechanics for girls was offered in his school this year for the first time. The respondent stated that the course was the most popular course for girls being offered in the curriculum of the school. This course the respondent recognized as being unusually important from the standpoint of home-making.

A second example of voluntary information pertinent to the study was received from a respondent who had seen a developing need for body and fender work due to the large number of old model cars owned by high school boys. From the standpoint of job analysis, this teacher had analyzed the needs of students, which is one of the first steps in undertaking any new phase of educational work.

PART B

Results of the Questionnaire

The results of each question asked in the questionnaire, is not discussed in the same sequence in which the question was asked. The writer has rearranged the data as to importance, and discussed the data which is more directly related to the job of teaching industrial arts. Each paragraph in which a question is discussed, gives a general idea of the nature of the question. If the reader desires to read specific questions, he may turn to the appendix where the questionnaire in its entirety will be found.

Teacher-Pupil Ratio. The importance of teacher-pupil ratio cannot be overlooked or emphasized as a primary consideration in teaching industrial arts courses. All industrial arts shops have limitations placed on facilities, when those limitations have been reached the shop is being operated under its capacity load. An increase in class enrollment indirectly limits the facilities and increases the danger of accidents. Teacher-pupil ratio should be determined by the size of the shop and the facilities therein.

Table 1 shows the teacher-pupil ratio of the respondents as reported from one hundred sixteen Oklahoma junior and senior high schools. One respondent failed to give this information. The table shows the teacher-pupil ratio, and the number and percentage of schools reporting the data.

TABLE I
TEACHER-PUPIL RATIO IN INDUSTRIAL ARTS CLASSES

Teacher-Pupil Ratio	Number of Schools	Teacher-Pupil Ratio Percentage
Less than 1-20	46	39.3%
1-20	40	34.1%
1-25	21	17.9%
1-30	5	4.2%
More than 1-30	4	3.4%

Of these same schools one hundred four, or 88.8 per cent, of the teachers believe that students should be permitted to take part in planning and analyzing the work they are expected to do; seven, or 6.0 per cent, believe they should not; five, or 4.2 per cent, were undecided.

Teaching Experience. Since the number of years taught by each respondent would have little in common with the study, this particular inquiry was divided into three broad divisions; those teachers who have over one year experience, those with over five years experience, and those with over ten years experience. This was purposely done in order that a comparison of opinions could be obtained of the new and older industrial arts teachers concerning those things related to job analysis. Two respondents failed to give this information.

Table II indicates at a glance, the three broad divisions of teaching experience and the number and percentage of teachers in each division.

TABLE II
DIVISIONS OF TEACHING EXPERIENCE

Teaching Experience	Number of Teachers	Percentage
1 to 5 years	52	44.4%
5 to 10 years	32	27.3%
More than 10 years	31	26.4%

Grade Levels. The grade levels in the school organizations studied varied greatly. There are only nine, or seven and one-half per cent, of the one hundred seventeen schools that are for junior high school students only. Seventeen, or 14.5 per cent, are for senior high only. Ninety, or 76.9 per cent, are junior and senior high schools in the same system or plant. One respondent failed to give this information.

In these same schools, twelve, or 10.2 per cent, have industrial arts for junior high school students, twenty-six, or 22.2 per cent, for senior high, and seventy-nine, or 67.5 per cent, for both junior and senior high.

The grade levels on which students are permitted to operate power machines varied greatly. Only sixteen, or 13.6 per

cent, permit junior high students to use the machines, seventy-two, or 61.5 per cent, use power machines for senior high, and twenty-eight, or 23.9 per cent, permit both junior and senior high students to operate power machines. One respondent failed to give this information.

Control projects in woodworking are used for junior high students by fifty, or 42.7 per cent, of the schools studied; twenty-six, or 22.2 per cent, use them for senior high, and thirty-four, or 29 per cent, use control projects for both junior and senior high school students. Three respondents failed to give this information.

Senior high students were found to be analyzing their work to the best advantage. Eighty-eight, or 75.2 per cent, of the respondents answered this inquiry. Ten, or 8.5 per cent, found junior high students analyzing their jobs better than senior high students; and eleven of the respondents stated that they could find no difference in analyzing taking place among the students on these grade levels. Eight, or 6.8 per cent, of the respondents failed to give this information.

One respondent volunteered the information concerning the use of power equipment. Industrial arts students on either grade level are not permitted to use the machines until they can pass some form of a qualification test. This respondent has over ten years teaching experience in industrial arts and has never had a serious accident among the students. This respondent practices and teaches safety in the school shop.

Table III shows the comparison of the grade level activities in industrial arts. The table shows the wide range of variation in practices in the industrial arts shops of Oklahoma Junior and Senior High Schools.

TABLE III
COMPARISON OF GRADE LEVEL ACTIVITIES

	Grade Levels in School	Grades Taking Ind. Arts	Grade Level Using Pwr. Eqp.	Grade Level for Control Projects
	Number	of	Schools	
Both Jr. & Sr. High School	90	79	28	34
Only Jr. High School	9	12	16	50
Only Sr. High School	17	26	72	26

Course Analysis for Industrial Arts. Course analysis must precede course organization. In the organization of a new course of study for industrial arts the objectives must first be determined. Determining the objectives make it possible to organize the course in such a manner as to better achieve the objectives. The objectives of a course will govern the activities contemplated for the course. A complete analysis of possible operations or jobs can be made after the selection of activities for the course have been established.

The information received from the one hundred fifteen respondents who answered the inquiry, varies greatly concerning course analysis. Seventy-five, or 64.1 per cent, believe that course analysis must precede course organization; fifteen, or 12.8 per cent, did not believe that course analysis must precede course organization; and twenty-five, or 21.3 per cent, were undecided about the question. Two respondents failed to give this information.

Table IV shows one hundred fifteen industrial arts teachers opinions concerning the question; "Do you believe that course analysis must precede course organization"?

TABLE IV
TEACHERS OPINIONS ON COURSE ANALYSIS
PRECEDING COURSE ORGANIZATION

Opinions	Number of Schools	Percentage
Yes	75	64.1%
No	15	12.8%
Undecided	25	21.3%

Separate Courses Being Taught. The variation of courses being taught in the schools studied was greater than the writer had anticipated. Some of the schools had only one course in industrial arts, in which case the course was usually woodworking. Although the majority of the schools studied had only one or two courses in industrial arts, several of the larger schools had as many as ten different courses in the industrial arts curriculum. There is a total of twenty-four different industrial arts courses being taught in all of the schools combined.

Table V shows the various courses being taught in the schools studied. The name of the course is listed, and the number and percentage of the schools in which the course is being taught.

TABLE V
SEPARATE COURSES BEING TAUGHT

Name of Course	Number of Schools	Percentage
1. Photography	1	.8%
2. Handicraft	1	.8%
3. Body and Fender	1	.8%
4. Wood Turning	1	.8%
5. General Repair	1	.8%
6. Furniture Designing	1	.8%
7. Forging	1	.8%
8. Foundry	4	3.4%
9. Textiles	2	1.6%
10. Ceramics	3	2.5%
11. Community Mechanics	5	4.2%
12. Printing	7	5.9%
13. Farm Mechanics	10	8.5%
14. Art Metal	10	8.5%
15. Machine Shop	12	10.2%
16. Auto Mechanics	12	10.2%
17. Welding	16	13.6%
18. General Electricity	18	15.3%
19. Plastics	20	17.0%
20. Leatherwork	23	18.1%
21. General Metalwork	23	18.1%
22. Mechanical Drawing	80	68.3%
23. General Woodworking	113	96.5%
24. Carpentry	26	22.2%

Woodworking, mechanical drawing and carpentry are being taught in more of the junior and senior high schools than any other of the industrial arts courses. Only four respondents did not teach woodworking.

Future Planning and Analyzing. There were forty-eight, or 41 per cent, of the teachers answering the questionnaire who indicated that they do the planning and analyzing for the next school year at the close of the present term. Forty, or 34.1 per cent, do the planning and analyzing when the school opens for the beginning of each new term. Twenty-five, or 21.3 per cent, do future planning and analyzing during the summer months. Four, or 3.4 per cent, of the respondents failed to give this information.

Table VI indicates at a glance, the comparison of the times for planning and analyzing of the respondents who reported this information.

TABLE VI
FUTURE PLANNING AND ANALYZING

Time of Planning & Analyzing	Number of Teachers	Percentage
Opening of Term	40	34.1%
Close of Term	48	41.0%
Summer Months	25	21.3%

Some of the respondents who indicated that planning and analyzing was done at the close of the term, also indicated that some of the work was carried on during the summer.

Safety Programs and Accident Comparisons. There are ninety-five, or 81.1 per cent, of the schools studied that have safety programs in industrial arts. There are twenty-two schools, or 18.8 per cent, that do not have safety programs. There were only nine serious accidents in the shops of the one hundred seventeen schools studied. Six, or 66.6 per cent, of these accidents occurred in the twenty-two schools that do not have safety programs. Three, or 34.4 per cent, of the accidents occurred in the ninety-five schools that have safety programs. One hundred eight of the one hundred seventeen schools studied did not have any serious accidents in the industrial arts shops during this school year.

Table VII shows the comparison of the accidents in the schools that do not have a safety program with those schools that have safety programs.

TABLE VII
SAFETY PROGRAMS AND ACCIDENT COMPARISONS

Number of Schools With Safety Program	Number of Serious Accidents	Per cent	No. of Schools Without Safety Programs	No. of Serious Accidents	Per cent	No. of Schools Having No Accidents
95	3	34.4	22	6	66.6	108

This data shows that 50 per cent more accidents occurred in the shops that do not have safety programs.

Use of Achievement Tests. A majority of the respondents do not give achievement tests to industrial arts students. Only twenty-three, or 19.6 per cent, indicated the use of these tests for the purpose of diagnosing industrial arts students. There were ninety-two, or 78.6 per cent, that indicated that they did not use achievement tests. There were two, or 1.6 per cent, of the respondents that failed to give this information.

Effectiveness of Job Analysis. There were ninety-four, or 80.3 per cent, of the respondents that indicated a belief that job analysis is effective in teaching industrial arts. There were four, or 3.4 per cent, that indicated they did not believe that job analysis would be effective in teaching industrial arts, and there were seventeen, or 14.5 per cent, of the respondents undecided about this inquiry.

One hundred seven respondents believe that a required course in job analysis would be of exceptional benefit to industrial arts majors in college, especially if teaching industrial arts is contemplated. Nine, or 7.6 per cent, do not believe that a required course in job analysis would be of exceptional benefit to future industrial arts teachers. One respondent failed to give this information.

One hundred eight, or 92.3 per cent, of the respondents believe that the progress of science and industry in this country will create a greater demand for careful planning and job analysis on the part of the industrial arts teachers;

twelve, or 10.2 per cent, do not believe this. Four, or 3.4 per cent, of the respondents failed to give this information.

Eighty-four, or 71.7 per cent, of the respondents believe that job analysis, if put into operation, would decrease the number of disciplinary problems with students in industrial arts courses. Twenty-seven, or 23 per cent, do not believe this; six, or 5.1 per cent, of the respondents failed to give this information.

Teacher Education. One hundred four, or 88.8 per cent, of the respondents believe that more extensive and intensive teacher education would help solve many of the problems confronting industrial arts teachers; twelve, or 10.2 per cent, do not believe this. One, or .8 per cent, of the respondents failed to give this information.

Table VIII indicates the approximate number of years the teachers have practiced job analysis, as reported by one hundred five of the teachers questioned. Twelve respondents failed to give this information.

TABLE VIII
NUMBER OF YEARS TEACHERS HAVE
PRACTICED JOB ANALYSIS

	Number of Teachers	Percentage
1 to 5 years	56	47.8%
5 to 10 years	21	17.9%
More than 10 years	14	11.8%
None	14	11.8%

Job analysis can be applied to the various duties and tasks in industrial arts shops to a good advantage. The opinions of the one hundred seventeen respondents indicates a need for job analysis. Better instruction is always one of the primary objectives of industrial arts teachers. One way to achieve this to a higher degree is to analyze the obstacles confronting the teachers.

A note of bitterness was detected in a voluntary statement from one of the respondents. The respondent believed that administrators should analyze their jobs to see if industrial arts is related to it in any manner or fashion.

It was found that the younger industrial arts teachers had a better understanding of the term "Job Analysis" than did the older teachers. It was evident that some of the older teachers were quite radical in their treatment of the term.

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

This subject was chosen for study because of the potential need for improved instruction in industrial arts. The writer realizes that since there is not a required course in job analysis on the college level, the knowledge of the respondents regarding job analysis was somewhat limited. The results of the questionnaire showed that a majority of the respondents believe that a required course in job analysis for industrial arts majors would be of exceptional benefit if teaching was contemplated.

Conclusion

A large majority of the schools have woodwork shops. This indicates that industrial arts majors are getting more woodworking in college than other industrial arts courses. A diversity in the Industrial Arts Education curriculum would be of value to industrial arts majors.

More than three-fourths of the schools have industrial arts for both junior and senior high school students, and more than two-thirds of these schools permit only the senior high students to operate power machines; this indicates that it is probably not a safe practice to permit junior high students to use these machines.

It is believed that the forty-eight teachers that do the planning and analyzing for the next school year at the close

of each term, can initiate a more desirable program for industrial arts, than can the other teachers who plan at the opening of each term. This belief is based upon the fact that any revising of plans that may be necessary can be accomplished during the summer months before school opens for the new term.

A large percentage of the teachers questioned believe that more extensive and intensive industrial arts teacher education would solve many of the problems confronting teachers in the profession. There is a tendency to believe that more practice teaching should be required under closer supervision.

Approximately fifty per cent more accidents occurred in the shops that did not have a safety program; this indicates that safety cannot be over emphasized as an intergral and essential part of any industrial arts program.

A large majority of the teachers believe that students should be permitted to take part in planning and analyzing the work they are expected to perform. There is a tendency to believe that this educational experience should be practiced in industrial arts shops. A contribution to general education would be worth more than the time spent planning and analyzing the things involved.

Approximately 50 per cent of the teachers questioned, believe that course analysis must precede course organization. This indicates that aims and objectives may best be achieved if an analysis is made of the course before it is organized.

More than three-fourths of the teachers believe that senior high school students analyze their work better than do junior high school students; this indicates that a greater amount of individual instruction and supervision is required on the junior high school level.

Recommendations

1. The new teacher of industrial would reap many values from visits to industries where a detailed analysis is made for every job in the plant.
2. Analyzing the job of teaching industrial arts is essential if the teacher is to be aware of the many duties and tasks that comprise the job.
3. The industrial arts teacher should take advantage of any free periods for the purpose of analyzing procedures and instructional materials for class presentation.
4. More general shops should be established. Woodwork and mechanical drawing should not monopolize industrial arts in the public schools.
5. A state supervisor of industrial arts is needed to help plan safety programs and other activities for the industrial arts shops.
6. More achievement tests should be given in industrial arts for the purpose of locating abilities, weaknesses, and special aptitudes, and also to predict the things that need further attention.

7. There is a greater need for teacher-pupil planning in industrial arts for the purpose of new educational experiences, and informing the teacher of different student interests.

8. There is too much danger involved when seventh, eighth, and ninth grade boys are permitted to operate power machines.

9. A course in home mechanics for girls is conceivable if correlated with home economics.

A program of job analysis for industrial arts shops need not be as detailed as that of industry because of the nature of the work performed in the shops. If nothing more is accomplished than forming a mental analysis, then instruction will be better facilitated from the standpoint of attacking the various duties and tasks with objective procedures and processes in mind. If industrial arts teachers can teach students to analyze the work being done, less time can be spent in giving individual instruction and supervision; thus, providing more time for the industrial arts teacher to spend on other phases of the teaching job.

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APPENDIX

Oklahoma Agricultural and Mechanical College
School of Industrial Arts Education
and Engineering Shopwork

Stillwater, Oklahoma
March 14, 1951

Dear Sir:

It will be greatly appreciated if you will kindly supply the information requested on the enclosed questionnaire. A study is being made of "Job Analysis", and its application in Oklahoma Junior and Senior High Schools. If your school curriculum includes any type of industrial arts program, your answers to the questions are urgently requested.

To avoid or to reduce the possibility of a misunderstanding of the terms used, the definition of "Job Analysis" is included as a part of the questionnaire.

Enclosed you will find a self-addressed, stamped envelope for your convenience.

Your attention to this request will be greatly appreciated.

Sincerely,

Joe W. Lemley
Graduate student
Oklahoma A & M College

Approved by _____
C. L. Hill, Assoc. Prof.
Industrial Arts Education

Definition:

"Job Analysis" may be defined as the resolving or separating of any particular job into its component parts; in order that a critical examination can easily and rapidly be applied to each constituent set apart. Job analysis, as referred to in this questionnaire, is pertaining to the teaching job confronting each teacher of industrial arts for a specific period of time.

Note:

The industrial arts courses are commonly referred to in junior and senior high schools as shop courses and pertain to the industrial arts and not to Vocational Education as provided for by the Smith-Hughes or George-Barden Acts.

Instructions: Please answer by placing a check-mark in the parentheses to the right of each question.

1. What grade levels are included in the school organization?
junior high____(), senior high____(), both____()
2. On what grade levels are courses in industrial arts offered?
junior high____(), senior high____(), both____()
3. What is the average teacher-pupil ratio in the industrial arts classes?
less than 1 to 20____(), 1 to 20____(), 1 to 25____(),
1 to 30____(), more than 1 to 30____(),
4. On what grade levels are the pupils permitted to operate power machines?
junior high____(), senior high____(), both____()
5. Do you use standardized tests of achievement to determine the difficulties and abilities of the various members of the class?
(class diagnosis)
yes____(), no____()
6. Do you believe that course analysis must precede course organization?
yes____(), no____()
7. How many years teaching experience have you had in industrial arts including this school year?
1 to 5____(), 5 to 10____(), more than ten____()
8. Do you have a safety program in your industrial arts curriculum?
yes____(), no____()
9. Have you had any serious accidents among your pupils this school year? If so, check the approximate number below.
none____(), more than one____(), more than five____()

10. On what grade levels do you use control projects in wood-working?
junior high____(), senior high____(), both____()
11. Do you believe that job analysis is effective in teaching industrial arts?
yes____(), no____(), undecided____()
12. On what grade levels do you find students analyzing their work to the best advantage?
junior high____(), senior high____(), no difference____()
13. Do you believe students should be permitted to take part in planning and analyzing the work they are expected to do?
yes____(), no____(), undecided____()
14. When do you do your planning and analyzing for the next school year?
close of school____(), opening of term____(), summer____()
15. Do you believe a required course in job analysis would be of exceptional benefit to industrial arts majors in college?
yes____(), no____()
16. Do you believe the progress of science and industry in this country will create a greater demand for careful planning and job analysis on the part of the industrial arts teachers?
yes____(), no____()
17. Do you believe that more extensive and intensive teacher education would help solve many of the problems facing industrial arts teachers?
yes____(); no____()
18. Do you feel that job analysis would decrease the number of disciplinary problems with students in industrial arts courses?
yes____(), no____()
19. How long have you employed job analysis in your teaching of industrial arts including this school year?
over one year____(), over five years____(),
over ten years____(), none____()
20. What subjects or areas of the industrial arts are included in the curriculum of the school?
- | | |
|------------------------------|-----------------------------|
| Carpentry_____ () | Printing_____ () |
| Machine Shop_____ () | Auto Mechanics_____ () |
| Welding_____ () | Plastics_____ () |
| Leatherwork_____ () | Art Metal_____ () |
| Farm Mechanics_____ () | Ceramics_____ () |
| Textiles_____ () | Mechanical Drawing_____ () |
| Community Mechanics_____ () | General Metalwork_____ () |
| General Electricity_____ () | General Woodwork_____ () |

Others

The Follow-up Card. The writer attempted to phrase this message in a manner that would not cause hostile feelings on the part of the recipients toward the writer. The message was typewritten and read as follows:

On March 14, a questionnaire concerning "Job Analysis" in the industrial arts shop was mailed to you. If you already have the form completed and in the mail, disregard this reminder; if not, it would be greatly appreciated if you would complete the form and mail it to me at your very earliest convenience.

Sincerely,

Joe W. Lemley

Analysis of the Job of the Trade Teacher. The proceeding analysis of the job of the trade teacher was prepared by the members of the teaching and training staff of the Trade and Industrial Education Department of Oklahoma A & M College. The writer secured permission from this staff to use this material.

ANALYSIS OF THE JOB OF THE TRADE TEACHER

Operations	Information
1.	General information about T. & I. Education and its relationship to all organized educational effort. What teaching is. Professional ethics and obligation for self-improvement.
2. Plan what to teach	Objectives of course. Use of course outline and job schedule. Job breakdowns. Sources of information on course objectives and course content. Development of course content and instructional materials.

Operations	Information
3. Plan instruction	Utilization of job breakdowns in planning units of instruction. Selection of teaching techniques. Selection of teaching aids. Development and preparation of teaching aids.
4. Give instruction	How we learn (Principles). Methods of instruction (providing good learning conditions). Instructional procedures.
5. Develop good work habits in students	Relationship of work habits to course objectives. Responsibility of teacher. Methods of developing good work habits.
6. Manage the shop	Tool and material handling. Time check system. Assignment to job and work stations. Student management responsibilities. Shop layout (for safety and efficiency). Anticipating, requisitioning and obtaining supplies and materials. Conservation of supplies, etc.
7. Provide for health and safety of students	Teacher's responsibility for health and safety of students. Safety consciousness of prospective workers. Use of safety appliances. Safe work habits as part of regular instruction on operations. Accident reporting procedures.
8. Create and maintain good human relationships a. students b. fellow-teachers c. supervisors d. others	Educational and personal objectives in promoting good human relationships. Simple precautions in dealing with students, fellow-teachers and others in the school system. The proper teacher-supervisor relationship. More advanced understandings and techniques for maintaining effective human relationships. The teacher's responsibilities as a representative of vocational education. (from No. 12)
9. Counsel students	Place of the shop teacher in the <u>guidance program</u> . Precautions in conditions of counseling students. Effective counseling and guidance procedures. Sources of guidance information relative to the student.

Operations	Information
10. Make records and reports	The need for and use of records and reports. What forms (particularly progress record) are required and how to fill out and use.
11. Maintain equipment	The teacher's responsibility for equipment. Planning and carrying out a maintenance schedule.
12. Evaluate the training	The purpose of evaluation. Establishing and maintaining standards of skills, understandings and attitudes. Importance of continuous evaluation. Elementary, essential techniques of evaluation. Advanced methods and practices in making both continuous and periodic evaluations. Distributions of evaluation results. Utilization of evaluations in improving instruction.
13. Establish and maintain effective industrial relationships and improve teaching	The desirable outcomes of a working relationship between industry and industrial education. The teacher's responsibility for keeping up with industrial developments in his field and for maintaining effective industrial relationships. The teacher's obligations for technical and professional self-improvement. (Advisory committees) (Apprenticeship programs)

TYPIST PAGE

THESIS TITLE: Improving Industrial Arts Teaching
Through Job Analysis

NAME OF AUTHOR: Joe W. Lemley

THESIS ADVISER: C. L. Hill

The content and form have been checked and approved by the author and thesis adviser. "Instructions for Typing and Arranging the Thesis" are available in the Graduate School office. Changes or corrections in the thesis are not made by the Graduate School office or by any committee. The copies are sent to the bindery just as they are approved by the author and faculty adviser.

NAME OF TYPIST: Joe W. Lemley