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ADAPTABILITY OF LOCALLY BASED TASK ANALYSIS

TO CURRICULA FOR REGIONS

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Phillip Mearl Mann

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ADAPTABILITY OF LOCALLY BASED TASK ANALYSIS TO CURRICULA FOR REGIONS

By

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ABSTRACT

ADAPTABILITY OF LOCALLY BASED TASK ANALYSIS
TO CURRICULA FOR REGIONS

By

Phillip Mearl Mann

Purpose: The purpose of this study was to acquire information about the adaptability of results of a task inventory analysis encompassing job skill incidents, job knowledge incidents, behavior incidents, and basic skill incidents, as verified by job incumbents, from a local area to a regional area. Information developed by this study might: reduce the necessity of replicating task inventory analysis surveys as part of the information needed for curriculum development at each local educational agency; and reduce the amount of resources necessary to implement curriculum development

Procedure: The procedure required the delineation of two occupations prior to the actual study of responses by job incumbents. Twenty-eight local directors of area vocational programs responded to an opinionnaire and their perceptions provided the basis for the selection of the two occupations, one perceived most likely to produce similar responses by job incumbents and the other least likely to produce similar responses.

The major aspect of the study included responses by job incumbents from two sites in Indiana and from one site in Michigan.

Each of the two survey instruments was composed of four sections: job skills, job knowledges, behaviors, and basic skills. Data were gathered about each of the two selected occupations. Forty-five respondents were secured for each occupation, fifteen at each of three sites, with not more than one survey instrument completed from any one business. Each job incumbent had a minimum of at least one year of experience and not more than five years' experience in the given occupation.

The multivariate analysis of variance was used for determining the statistical significance of the differences among the responses by the groups at the three sites relating to the job skills section. The Kruskal-Wallis statistic was employed for measuring the significance of the differences among the responses for the job knowledges, behaviors, and basic skills subsections of the instrument used.

Results and Conclusions: Two occupations were identified through the perceptions of local directors of area vocational programs. Keypunch occupation was perceived as likely to have the most similarities regardless of the site within a region while residential electrical occupation was perceived as an occupation likely to have the most differences.

The keypunch occupation had four items of 190 which were significantly different at the .05 level. The residential electrical occupation had twenty-six items of 205 which were significantly different at the .05 level. These findings appear to support the perceptions of the local directors of area vocational programs that the keypunch occupation was most likely to produce similar responses by job incumbents on a task inventory survey regardless of the location within a region.

The residential electrical occupation was perceived as least likely to produce similar responses by job incumbents on a task inventory survey regardless of the location within a region. Twenty-six of the items were significant at the .05 level and twenty-one could have been expected to be significant by chance alone.

It would appear that information regarding occupations perceived by local directors of area vocational programs as most or least likely to produce similar results, gained through task inventory surveys, could be transported from one local educational agency to another without duplicating the survey at the local site.

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CHAPTER I

INTRODUCTION

The Problem

This research represented an effort to provide additional knowledge regarding the adaptability of locally based task inventory analysis to curricula for utilization on a regional basis. This study focused upon the responses of job incumbents located in different geographical areas to an identified task inventory of job skills, knowledges, behaviors, and basic skills as a method of determining whether there was a difference in responses between sites which would negate utilization of information on a regional basis.

Educational administrators are faced with a most difficult challenge in establishing viable vocational programs for students that will prepare them in an ever-changing world of work. Not only are they faced with traditional concerns such as teacher capabilities, facilities, equipment, tax base, financing, time and manpower resources necessary for teaching a particular occupational offering, but more importantly the determination of an appropriate curriculum for that given occupation. Building good vocational programs takes knowledge of job opportunities and content necessary to prepare for those

opportunities. With the rapid change in technology it would seem necessary to develop a method of maintaining current content.

Further complicating the above concerns is additional research information about the mobility of graduates and the service area for local educational agencies. According to Haskin and Tumlin the traditional selection of occupational fields has been founded upon local community bases. However, almost every school now serves a region far beyond the district's geographical borders as well as a more mobile population.(36)* Accepting this would seem to indicate a need to provide suitable content developed on a regional basis for use by local educational agencies.

In the past few years there has been a renewed emphasis upon improvement of regional research and development regarding curriculum and dissemination of curriculum materials in vocational education. The United States Office of Education has established a curriculum dissemination network throughout the states. This network is based upon regional centers which collect, review, publish, and disseminate within their region curriculum materials for use by local educational agencies as well as provide a link in the network for procurement between regions.

In addition to the regional and national projects for curriculum and dissemination, another trend regarding

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*Number in parenthesis refers to the item in the numbered bibliography.

curriculum development was also identified. This trend was the development of curriculum utilizing tasks needed for entry and sustainment in an occupational area. Evidence of this was found in a number of funded projects at both state and federal levels. The following examples were some of those identified. A six-state consortium was developed in the Mid-West, through The Center for Vocational and Technical Education, concerned with a data processing occupational survey.(42) A grant was provided by the United States Office of Education to UCLA for the development of health occupations materials based upon task analysis. The Vocational-Technical Education Consortium of States (V-TECS) was formulated with its major purpose being the validation of task analysis information by job incumbents for specific occupational areas and an ordering of those tasks. These are just a few of the many projects which focus on task analysis information as a means of specifying content for curriculum development.

The review of literature of job or task analysis showed that although a renewed focus was placed on this method within recent years, it was not a new procedure. Task or job analysis for determining content was found to be a tool which had been used for many years by educators. As early as 1919 a process for task analysis was described by Charles R. Allen and again from the middle 1940's through the 1950's Verne C. Fryklund authored publications regarding this process. Marsh (1962) published a Job Analysis

Bibliography listing over 1,500 references. In the review of this publication many of the occupations involved were found to have duplicated studies by two or more agencies.

Many questions were raised during the initiation of this study. Some of them were: Should administrators of local educational agencies utilize, as one aspect of content specification, task inventory analysis information developed in one community regarding occupations without replicating the process in their own educational community? Would it be feasible to adopt curriculum materials generated by other educational agencies if the material were based upon task inventory analysis validated by job incumbents in a given occupation? Can a local educational agency financially support the review that appeared necessary to keep current with changing technology without a coalition with other educational agencies, such as on a regional basis?

All of the above questions and many more were posed; however, there appeared to be one overriding question which needed to be answered before any of the above could be addressed. Was there agreement with regard to identified subject content from one locality to another and how could this be determined? One method was to check the similarities as related to task inventories between communities that are located within a regional geographic boundary; this concept provided an underlying purpose for the study.

Purpose of Study

The purpose of this study was to acquire information about the adaptability of results of a task inventory analysis encompassing job skill incidents, job knowledge incidents, behavior incidents, and basic skill incidents, as verified by job incumbents, from a local area to a regional area. Information developed by this study might: reduce the necessity of replicating task inventory analysis surveys as part of the information needed for curriculum development at each local educational agency; and reduce the amount of resources necessary to implement curriculum development.

Objectives of the Study

The overall objective of this study was to determine for potential use by administrators of local educational agencies indicators of the extent that local task inventory surveys for entry-level skills in one occupational area are similar or dissimilar from those of the same occupational area in another geographical location.

In order to accomplish this objective the following questions were proposed for the study:

1. What occupations do directors of area vocational programs perceive as:

    a) most likely to produce similar responses by job incumbents on a task inventory survey regardless of the location within a region?

b) least likely to produce similar responses by job incumbents on a task inventory survey regardless of the location within a region?

2. Are the responses of job incumbents to the same task inventory similar enough to permit utilization of results from one site to another site without duplicating the survey?

Contributions the Study Might Make

It would appear, as a result of this study, information should be provided which would allow recommendations regarding: the extent to and conditions under which teachers and administrators should be encouraged to use task inventory surveys conducted by other local educational agencies, and the extent to which the perceptions of directors of area vocational programs about occupations as either most similar or least similar should be utilized.

Further, this research may contribute to the study of other identified occupations specifically not perceived either as most or least similar as identified by directors of area vocational programs.

Assumptions and Limitations

This study had the basic assumption that if there were general agreement among the responses by job incumbents to the task inventory survey at different geographical locations, then the task inventory survey could be utilized by

other local educational agencies without replicating the survey. Additionally, it provided a basis for transporting curriculum based upon this analysis.

A second assumption was that the methodology of devising the initial instrument was one of several valid procedures that could have been employed; and that the instrument used was accepted on face validity.

Another assumption was that local vocational directors at the secondary level would be an appropriate reference group regarding the similarities and differences among occupations at different sites.

Two kinds of limitations were recognized for this study. The first three limitations were identified as potential weaknesses. These were:

1. The number of occupations for this study was limited to those occupations for which surveys were implemented in Ingham Intermediate School District, Ingham County, Michigan;

2. Size of the sample was based upon the initial plan implemented by Ingham Intermediate School District; and

3. Utilization of the instrument and data developed by Ingham Intermediate School District sixteen months prior to the data-gathering activity for this study.

Secondly, five limitations pertaining to the scope of the study which were recognized were as follows:

1. Only two occupations were included in this study;

2. The areas in which surveys were administered to gather new data consisted of two, located in Indiana;

3. Data from an identical survey by Ingham Intermediate School District in Michigan served as the third site;

4. Only one survey per occupation per business was permitted; and

5. Although psychological and sociological foundations provide an additional dimension in curriculum development, those areas were beyond the scope of this study.

Hypotheses

The research hypotheses for this study were:

There will be no difference in the responses by job incumbents from one locality to another, as related to:

a. job skills indicated on the task inventory analysis;

b. job knowledges indicated on the task inventory analysis;

c. behaviors indicated on the task inventory analysis; and

d. basic skills indicated on the task inventory analysis.

Definition of Terms

Included in this section are the specific definitions as they were used in this study. References by Good, Chenzoff, Silvius, and Bohn were useful in defining the terms.

1. Analysis--the process of resolving any problem or situation into its component elements. The following are forms of analysis identified in this study:

   a) Cluster analysis--a simple form of correlational analysis in which clusters are formed of those variables (in a matrix) which have high intercorrelations with each other and relatively low correlations with the remaining variables in the matrix.

   b) Task analysis (used interchangeably with critical incident analysis and job analysis)--a method used to obtain salient facts about a job, involving primary and secondary sources relating to that job, in order to describe the work involved and the qualifications necessary for the worker who must perform it.

   c) Trade analysis--a systematic listing of all of the skills and knowledges that must be possessed by the worker in the trade.

2. Basic skills--abilities in the use of mathematics, reading, writing, communication, and any other skills considered important in order to begin training toward an occupational goal.

3. Behaviors--the manner in which someone behaves; social conduct, attitudes, personality.

4. Curriculum development (building)--the systematic procedure of developing a suitable curriculum for a particular school or school system, involving the organization of working committees under expert direction; the choice of general and specific aims of instruction and means of evaluation; the preparation of official courses of study; and improvement of the existing educational program.

5. Job knowledge--a mental activity; acquaintance with or understanding the job and the tasks involved; condition of being aware of something related to the job.

6. Job skill--a manipulative, physical activity that is actually performed on the job.

7. Task--a logical and necessary step required for the completion of a job objective.

Organization of Thesis

This dissertation is organized into five chapters, bibliography, and appendices. The main content areas of the final four chapters have been listed below.

Chapter II, review of literature, focused on the place and utilization of task analysis information in curriculum building. This was a broad schema, attempting to identify task information as a tool in the process, rather than an end in itself, toward development of vocational curriculum.

Chapter III provides a review of the procedure employed, instrumentation, population, and analysis utilized in this study.

Chapter IV sets forth the data, perceptions of local vocational directors of area programs and the findings as related to the respondent groups studied.

Chapter V consists of the summary, conclusions, recommendations, and author's observations. Included in the summary are brief statements of the purpose of the study, review of literature, procedures, and findings.

CHAPTER II

REVIEW OF LITERATURE

The purpose of this chapter is to review and classify some of the literature and educational research which had been published relating to the area of task analysis as it pertained to curriculum development for vocational education. Charles R. Allen in The Instructor, The Man and The Job, published in 1919, explained the use of trade analysis as the first operation in the determination of what was to be taught including skills, technical terms, mathematics, safety, etc., in industrial occupations. Allen recognized the instructor as a competent artisan capable of compiling such an analysis; however, he recommended a review by a practicing tradesman.

Verne C. Fryklund, in the middle nineteen-forties, authored a text entitled Analysis Technique for Instructors, a refinement of trade analysis. Fryklund suggested a method which not only provided a listing of tasks and knowledges but also a matrix approach for ordering these into a sequential priority listing for teaching.

There was increasing importance given to the use of task analysis in curriculum development for programs in vocational education. Since the late fifties there has been an abundance of literature with respect to actual studies

utilizing some form of job or task analysis. Marsh (1962) published a Job Analysis Bibliography listing over 1,500 references. Those studies were concerned with job classification, many involving the same occupations although conducted in different locations.(29:7) The Armed Forces, through a contract during the middle nineteen-sixties with the George Washington University, Human Resources Research Office, began a focus on task analysis as a method for improving the Armed Forces' educational system.(30)

Although much has been published concerning job or task analysis, published resources are limited on the subject of task analysis as applied to curriculum development. That which had been written reflected an application toward a specific approach rather than a broad approach with regard to implications for use of task analysis information.

The remainder of this chapter has been divided into four distinct sections: types of occupational analysis; task analysis applied to educational concerns; trends toward regionalization; and summary.

Types of Occupational Analysis

The literature, including reports of research projects in vocational education, supports the contention that there were two main types of occupational analysis for curriculum, those being function and job or task.

The functions approach focuses on the identification of the functions of industry such as fabricating or

processing, purchasing, and accounting which are performed within the industry as a preliminary step. The second aspect is the determination of the activities necessary for accomplishing the functions. From these activities the competencies are identified which are needed by individuals expected to perform the activities. (Albracht, Clark, Meaders, and others.) Functions of a business or industry have been defined as, "The operations that must be performed somewhere in the total business or industry in order for it to be successful or to continue in operation."(24:1)

Although the functions approach was one alternative for content identification in vocational education, the focus of this study was on task analysis. There appeared to be much discrepancy by authors in the use of terms such as task and job. This "resulted in the use interchangeably of such terms as 'job,' 'position,' 'task,' and 'duty.'"(48:22) The authors of a majority of the references most frequently used either job or task analysis. The difference between job analysis and task analysis appeared to lie in the definition of terms and the interpretation of the size of the unit used.(48:19)

Job analysis was defined in the Dictionary of Education as "the basic method used to obtain salient facts about a job, involving observations of workers and conversations with those who know the job, in order to describe in detail the work involved, the conditions under which it

must be performed, and the qualifications necessary for the worker who must perform it."

Among the numerous authors, the terms job and task analysis were used in many different ways; there was no one approach to terminology. For example, Giachins and Gallington (1967) refer to job analysis as a technique of making an inventory, based on the work which an individual performs, of all the learning activities associated with a specific occupational area. Welch (1968) suggests tasks are below managerial level, while Folley (1964) indicated that it consists of whatever information is required of those tasks for completion of an educational training situation analysis.(49:21-3) Variations in scope of reference for job or task analysis appeared to impact on the use of terms. Job analysis tended to be broader in scope while task analysis was more finite in the unit of measurement. The purpose of both was to identify work patterns which were performed by an individual in a given occupation.

Task analysis means, for purposes of this study, a basic method used to obtain salient facts about a job, involving primary and secondary sources relating to that job, in order to describe in detail the work involved and the qualifications necessary for the worker who must perform it.

Task Analysis Applied to Educational Concerns

There appeared to exist a number of major concerns regarding education. Some of these include quality of

programs, identification of content, relevancy, and evaluation, to name a few. Occupational information regarding skills, knowledges, behaviors, and basic skills seemed to be essential to quality vocational programs regardless of the instructional methodology employed. Specificity of information should enhance the planning, implementing, and evaluating phases of the educational system. Task analysis, one method of determining characteristics of realistic content, seemed adaptable and necessary for vocational curriculum development.

Dr. Coe, past president of the American Technical Education Association, states that a quality vocational program is based upon an analysis of each occupation to determine what is required for an individual to perform as a successful worker in that occupation. He further suggested that this should encompass more than knowledge and skills, including responsibility and good working habits and relationships with fellow workers.(33:193)

Mager and Beach, in their book Developing Vocational Instruction (1967) specify three goals for instructional development. These relate to: (1) determination and description of the anticipated achievements, (2) application of methodology for achieving the desired result, and (3) evaluation to determine accomplishment. Student descriptions coupled with the task analysis information provides guidelines for the development of course objectives. Mager and Beach suggest that the task analysis provides detail

for the "blueprint" of course development. It is through this initial process of task analysis, coupled with descriptions of students, that objectives can be stated in terms of the expected outcomes.(15)

Coster, Morgan, and Dane, Jr., developed a model for education for occupational proficiency. One of several elements in their model was labeled "curriculums based on occupational information and societal demands modified by the individual attribute system." Although the element was lodged in the school system, derivation of content was from the occupational structure in our society.(34) A model such as this must be accepted as a viable on-going concept and not static in nature. Carrying this thought forward, an implication could be drawn that derivation of content from the occupational structure for inclusion in the educational element must also be on-going. Burr D. Coe (1971) supports this as he states, "it is not enough to make an occupational analysis once; the analysis must be constantly updated."

Job or task analysis was found to be a major initial step in the development of curriculum. This places task analysis as one of the critical components in ascertaining the validity of course design decisions. Choice of instructional methodology, such as programmed instruction, individually paced, or other, follows. (Clawson, Butler, and others.) As an example, the development of detailed statements of objectives must be based upon specific knowledges

and skills regarding the occupation which can be derived from task analysis. (Smith.)

Cluster Concept Based on Task Analysis

Another concern facing the educational community relates to specificity of vocational education. The cluster concept, providing experiences around a group of similar jobs, was an approach which appeared to have gained recognition. It seemed that utilization of task analysis information with this concept was appropriate.

Although the cluster concept appeared to be gaining in popularity, authors did not utilze a common language as they developed variations in the process or approach for clustering commonalities. Such terms as job analysis, computerized analysis of tasks, systematic approach to multidimension analysis, etc., were adopted to provide an identity to the specific work of each individual or groups of individuals emerging as leaders in this area. Inherent in each of the approaches was the identification of commonalities of work performed among occupations by an individual in a given occupation. Stated another way, it was the identification or analysis of tasks performed by incumbents in that given occupation. The following examples illustrate this aspect.

Maley, University of Maryland, used the term job analysis in his approach to the cluster concept as a basis for curriculum building. The job analysis of occupations

provided information for behavioral statements and instructional sequencing.(16)

In another study conducted by Silverman, an advanced computerized technique was described for clustering work tasks. Through a computerized analysis of tasks performed in a sample of jobs, this technique provided a series of homogenous clusters of task patterns. The technical objective of the initial study was to develop a method for arranging individual task patterns, identified by job incumbents, into clusters.(48:43)

Systematic Approach to Multidimensional Occupational Analysis (SAMOA) is described in several documents (Carr and Silverman, 1966; Carr, 1967; and Carr, 1968). This provides a clustering method based on homogenous work groups and the similarity of pattern of tasks performed in relationship to signficant variables within three dimensions of the work situation. The first step in this process employs the development and administration of comprehensive task lists.(48:48)

Within the field of occupational education, the typical approach to the clustering of task patterns has been the focus on identification of common skills, behaviors, knowledges, etc., among jobs in order to design curriculums that are generalizable. This clustering approach has been accomplished primarily through task analysis.(29:42)

System Approach Utilizing Task Analysis

Educational system planning, instructional systems development, system approaches to education, and numerous

other terms are appearing regarding educational curriculum building. Most authors, if not all, introduce their topic by referring to a system approach to building educational curriculums.

System is defined (Webster's Dictionary, 1971) as: "a set or arrangement of things so related or connected as to form a unity or organic whole . . ."; "a set of facts, principles, rules, etc., classified or arranged in a regular, orderly form so as to show a logical plan linking the various parts"; and "a regular, orderly way of doing something; order; method; regularity."

System approach is generally referred to as a type of logical problem-solving process. System approach requires identification of the purpose (objectives) and performance expectations so that a system may be planned, designed, developed, installed, and managed. (Banathy, 1968.) Kauffman (1972) defines the system approach as

> a process by which needs are identified, problems are selected, requirements for problem solution are identified, solutions are selected from alternatives, methods and means are obtained and implemented, results are evaluated, and required revisions to all or part of the system are made so that the needs are eliminated.(11:9)

System approach to building vocational education appears to stem from the system approach developed by the Armed Forces during World War II.

Research in the armed services has contributed much to the literature of the system approach to building

vocational educational curriculums. The initial step usually consists of analysis of the job requirement.(48:48) (Chenzoff and Folley, 1965; Carr and Silverman, 1966; Marsh, 1964; and others.)

A decision was reached as a result of a comprehensive study conducted by Raymond E. Christol, Chief Occupational and Career Development Branch, Personnel Research Division, U. S. Air Force, that some type of task inventory survey procedure had the greatest probability of satisfying the requirements of a sound training program for the occupational world.(52) In the development of curriculum through the system approach, authors such as F. Coit Butler (1972) and Roger A. Kauffman (1972) agree with Christal to the degree that they include task analysis in their process as a part of the system for validating relevant content for curriculum building.

The process of identifying needs through a task inventory analysis is one of providing the identified basic information necessary for setting valid goals to assure that the content has been properly identified. Kaufman suggests that it is necessary to define that statement of need. However, he suggests rather strongly that it is quite pertinent that a solution for that statement of need should not be included as a how-to-do-it statement. His rationale is that a statement of need or an identified task with a given solution would automatically reduce the options for meeting

that need or, to state it another way, of producing the most viable curriculum path for that individual student.

Trends Toward Regionalization

After determining the occupational areas for which instruction is to be provided, such as business, health services, agriculture, or other fields, comes the responsibility of curriculum development: assembling units of instruction into modules or courses and the combining of these into a sequential curriculum. These curricula must meet the skills, knowledges, behaviors, and basic skills of the occupational objective as well as the prescribed requirements of the school or institution for completion of the program.

Traditionally the selection of the occupational offerings for which schools offered specialized preparation as well as the content regarding skills and knowledges of the occupational area were based upon the local community.(36) With the changes in society including advancement in technology as well as mobility patterns regarding employment it appears that the traditional base needs to be broadened. Haskin and Tumlin suggested that almost every school now serves a region far beyond the district's geographical borders as well as serving a more mobile population. They questioned the rationale of choosing curriculum options on the basis of community-oriented data.(36) This is further supported in documents provided through the Employment

Security system which now includes data regularly collected about mobility patterns of workers on a multi-county basis.

Several studies, as early as 1961 and 1962, addressed this concern related to local or regional use of survey instruments in vocational education. Jacoby and Novak, in their discussion of the survey as a major tool, suggested that surveys are indispensable but that surveys for vocational programs could be regional in nature.(44) Ruppert Evans, University of Illinois, commented even more strongly as he suggested that the local survey was no longer of value because of the great increase in mobility of both industry and labor and felt that regional or national surveys were needed.(39)

The number and scope of research grants at both state and federal levels appeared to support a movement for regional or national emphasis on curriculum material development and task analysis surveys regarding content for curriculum development. To illustrate this concept a few examples are provided.

The United States Office of Education, in late 1967, provided a grant to the University of California, Los Angeles, to develop educational materials based upon task analysis for more than eighteen allied health occupations. Educational levels included were through the Associate of Arts Degree. The basic information was secured through a national survey of recently licensed practitioners. Task inventories were developed and made available to schools and institutions,

and occupational analyses were completed for some of the eighteen occupations under consideration.(42)

The Michigan Department of Education (1971) funded a research project entitled "An Individualized System for the Developing of Curriculum on a Modular Basis through the Techniques of Occupational Task Analysis." One of the objectives in this project was to provide a bank of occupational information through the use of a task inventory in a survey of job incumbents of a given occupation. This information could then be used by other educational agencies.(53)

An example of national dissemination of information for curriculum was the development of the "Instructional Objectives Exchange" at Los Angeles. This system provided, at minimal cost, the opportunity for educational agencies to procure performance objectives developed at other institutions in most discipline areas.(54)

Further, the writer was involved in the following examples showing state and multi-state developments. The State Board of Vocational and Technical Education in the State of Indiana, through the Indiana State Department of Education, Division of Vocational Education, funded a project to produce a system for developing learning activity packages and implementation of the system. The conceptual framework included using task inventories as a basis for curriculum development. These task inventories were validated by job incumbents throughout the State of Indiana.

Learning activity packages were developed from an analysis of the inventories and made available to educational agencies in the State.

An eleven-state consortium was formed to develop learning activity packages in the area of Distributive Education. The states involved were located from the South to the North in the middle of the United States. Each state accepted the responsibility for developing a specified number of learning activity packages as well as field testing learning activity packages produced outside their own state. An underlying premise was that a reduction of needed resources at the local level could be achieved through such a consortium. All learning activity packages were based upon a survey of tasks needed in the occupational area of distribution.

It appeared that the increased activity over the past ten years provided an indication of the trend toward regionalization regarding information for curriculum development.

Summary

The literature, although fraught with subtle modifications of terminology, appeared to carry several common threads, regardless of the methodological approach toward curriculum development. Whether termed specific goal statements, needs assessment, task analysis, job analysis, system approach, or some other term, all tend to agree that

identification of specific content for occupational areas was needed as a foundation for curriculum development. Suggestion of an analysis of the actual occupation to garner this information tended to be another common thread.

Additionally, the movement away from local surveys to regional efforts to discern specific subject content appeared to be a major trend. This support appeared strong when grants, both federal and state, were reviewed.

If valid content through task analysis can be identified and provided for educational agencies at the local level, it should follow that resources formerly used for that purpose could be devoted to other aspects of curriculum development.

CHAPTER III

PROCEDURE OF THE STUDY

The purpose of this chapter is to describe the procedure which was used in conducting this study. This chapter addresses two phases of the study. Phase one pertained to the delineation of occupations to be included in this study and phase two involved the major area of research. Procedures for analysis and interpretation of data and the summary complete this chapter.

Phase One

Phase one was concerned with the activities necessary to gather information from vocational directors about which of several occupations were most likely to have similar job tasks regardless of the geographical region. Topics included within this phase were data collection and procedure for handling data.

Data Collection

The objectives of the study necessitated gathering data from directors of area vocational programs regarding their perceptions. The data collection category was divided into three components: development of the instrument, population, and procedure for collecting data.

Development of Instrument. A survey instrument was developed to be administered to directors of area programs in the State of Indiana for the delineation of the occupations for inclusion in this study. The instrument was designed to gather two basic kinds of information: the first was educational and occupational information pertaining to the respondents while the second was opinions of the respondents about the occupations in question.

The educational and occupational information provided data for comparison against standards for which acceptance or rejection of respondents could be made. The following criteria were determined as minimal for acceptance: (1) two years' trade training or the equivalent through a planned educational pattern including a minimum of fifteen hundred clock hours of approved and supervised work in the areas of specialization under an approved teacher-training program, (2) full-time vocational administrator, (3) previously had taught vocational education, (4) at least two years in the community, and (5) formal training in administration, supervision, and philosophy of vocational education. Appendix "A" and "B" provides additional information regarding the educational and occupational data.

The second component of the instrument for the area directors provided a listing of forty-nine occupations and a five-point scale for each occupation. The directors were instructed to respond to each occupation by circling the appropriate number on the scale where one (1) represented

extremely small or no differences, and five (5) represented many or significant differences. (See Appendix "A".)

Pre-testing was accomplished in the following manner. This instrument (Appendix "A") was sent to four of the thirty-two area vocational program directors identified in the State of Indiana for inclusion in this study. These four were selected at random from the list which was compiled from information obtained from the State Board of Vocational and Technical Education, Division of Vocational Education, Department of Public Instruction in the State of Indiana. These four were subsequently excluded from the final population.

A cover letter (Appendix "A") was sent with the instrument notifying them of a telephone call which would be made to establish an appointment to pick up and discuss the instrument. The following questions were posed to each of these individuals at the time the instruments were collected:

1. Do you understand the request for this information?
2. Were the instructions clear and easy to follow?
3. Was the format convenient for ease of answering?
4. Were there any objections to information requested regarding the respondent?
5. Do you have any suggestions regarding this instrument?

Population of the Directors of Area Vocational Programs. The population, for participation in this study, of

directors of area vocational programs were those directors recognized by the State Board of Vocational and Technical Education in the State of Indiana. The following four criteria were developed and used as determinants for inclusion of those individuals identified: a vocational director's certificate, two years of residency in the local community, full-time position as a vocational director, and two years of occupational experience outside the field of education. It was felt that these criteria provided further rationale for their knowledge and expertise in the vocational area.

First, a vocational director's certificate provided commonalities such as: prior vocational teaching experience; formal education relating to the administration of vocational education; philosophy of vocational education; and a master's degree in education, to name a few. (See Appendix "B" for further specificity.)

Second, it was felt that the individual must have been in a given community at least two years to have acquired the basic understanding of that occupational community necessary to provide a realistic opinion as related to the questions in the instrument.

Third, the position occupied as a director of vocational programs must be a full-time responsibility.

Finally, occupational experience was felt to be an advantage in responding to the opinionnaire; therefore, a minimum of two years' experience was established.

With these criteria, thirty-two area vocational directors were identified. Of these thirty-two, four were randomly selected for the pre-testing of the instrument leaving twenty-eight area vocational directors available for the study.

Procedure for Collecting Data. An opinionnaire was sent to twenty-eight directors of area vocational programs along with a letter of introduction and a memorandum from the Indiana State Director of Vocational Education. (See Appendix "A".) Where needed a follow-up letter was sent at the end of two weeks after which a few directors were contacted by telephone. This procedure resulted in a 96.43 percent return.

Procedure for Handling Data

The number of questionnaires, which elicited information pertaining to educational and occupational characteristics and opinions of directors of area vocational programs, was sufficiently small in number so that it was possible to hand tabulate the data.

Phase Two

The second phase of the study, the major research, involved a survey of job incumbents. The purpose was to determine whether the responses of job incumbents to the same task inventory were similar enough to permit utilization of results from one site to another site without duplicating the survey. Topics included within this phase were data collection and procedure for handling data.

Data Collection

The objectives of the study necessitated gathering responses from job incumbents regarding a task inventory. The data collection category is divided into three components: development of the instrument, population, and procedure for collecting data.

Development of Instrument. The instrument used for this study consisted of four subsections. The sections were: job skills (a manipulative, physical activity that is actually performed on the job); job knowledges (a mental activity; acquaintance with or understanding the job and the tasks involved; condition of being aware of something related to the job); behaviors (the manner in which someone behaves; social conduct, attitudes, personality); and basic skills (the ability to use mathematics, reading, writing communication, and any other skills considered important in order to begin training toward an occupational goal). Within these subsections there was some clustering of items into categories according to commonality of items.

The original development of these instruments by the Capital Area Career Center involved several steps designed to insure both validity and reliability. A list of task statements called "critical incidents" were developed for each of the subsections through the use of existing data, job descriptions, curriculum guides, textbooks and experts in the occupational area. These lists were submitted for review to advisory bodies consisting of persons in business

and industry. After soliciting responses from this group the instrument was modified accordingly. The modified instrument was then submitted to job incumbents with an opportunity to add or make suggestions regarding actual practices in their occupation. This modified instrument was then utilized by Ingham Intermediate School District in developing data for eighteen broad occupational groupings including forty-nine specific occupations. The most commonly found occupational programs in the secondary school programs were included in this list with the exception of agriculture. There were differences in instruments and their construction. Some appeared to be broader in scope for some occupations than might be necessary. However, since this instrument was used and found to be satisfactory, the instrument was accepted on its face validity for use in this study. (See Appendix "C".)

Population of Job Incumbents. The population for the major phase of the study consisted of forty-five job incumbents for each occupation or a total of ninety job incumbents. Each occupation utilized original data retrieved for fifteen job incumbents by Ingham Intermediate School District, Mason, Michigan. Additionally, fifteen job incumbents for each occupation were selected at each of two sites in Indiana.

The selection of sites in Indiana was based upon three criteria. One was the necessity of having an area vocational school serving that geographical location. The

second related to the size of the city in which the vocational school was located. The third criterion was the presence of an advisory committee in the area vocational center for the occupations in the study.

The sites chosen were Elkhart, Indiana, and Indianapolis, Indiana. According to the Indiana Code of 1971, Elkhart was the smallest city which provided an area vocational program. The service area included approximately an equal mix of urban and rural community settings. Indianapolis was the largest metropolitan area in the State of Indiana, with primarily an urban demography. Both sites met the criteria listed above.

The advisory committees for each occupation in each of the sites selected provided a list of businesses that consisted of five businesses that employed less than fifteen employees, five businesses that employed fifteen through twenty-nine, and five that employed thirty or more.

The job incumbents who completed the questionnaire had a minimum of one year and not more than five years' experience in the occupation. Additionally, only one employee per business was selected as the job incumbent respondent.

Procedure for Collecting Data. Utilizing the lists provided by the advisory committees from the vocational schools, a telephone call was made by the researcher to the contact persons at each business to schedule a meeting. At this meeting an explanation was provided regarding the

survey instrument. Further, a job incumbent was selected at that time who met the criteria regarding time of employment in the occupation. The instrument was explained and a telephone number was provided should the job incumbent have any questions during the completion of the instrument. Further, a time was scheduled when the survey instrument could be retrieved.

When the survey instrument was collected, it was checked for completeness and again the individual was asked if there were any concerns or questions regarding the instrument. This method resulted in a one hundred percent return.

Procedure for Handling Data. The procedure for handling data retrieved from job incumbents involved a transfer from the instruments to data cards. First, the data from the instruments administered at the two sites in Indiana were keypunched at Ingham Intermediate School District in the same format which had been developed for that system. This provided compatible data between the three sites.

Although the system provided accuracy and compatibility, only one piece of information was stored per card, per respondent, thereby creating a time-consuming and costly process. A program was written to collapse these data onto fewer cards which provided a manageable system. The Michigan State University computing facilities were used for this and subsequent data treatment.

Analysis and Interpretation of the Data

The following is sectioned into three major areas: questions to be answered in the study, statistical analysis of data, and hypotheses to be treated.

Questions To Be Answered in the Study

The overall objective of this study was to provide to local educational agencies indicators of the extent that local task inventory surveys for entry-level skills in vocational education of one occupational area are similar or dissimilar from those of the same occupational area in another geographical location. Three questions were raised regarding this major objective as related to the procedure adopted:

1. What occupations do directors of area vocational programs perceive as most likely to produce similar responses by job incumbents on a task inventory survey regardless of the location within a region?

2. What occupations do directors of area vocational programs perceive as least likely to produce similar responses by job incumbents on a task inventory survey regardless of the location within a region?

3. Are the responses of job incumbents to the same task inventory similar enough to permit utilization of results from one site to another site without duplicating the survey?

Analysis of Data

The data regarding the first two questions, responses by directors, were analyzed by frequency of response to determine the occupations to be included in the study.

The major aspect of the study was treated in the following manner:

The four subsections of the instrument provided two different types of responses. The subsection concerned with job knowledges sought a dichotomous response in the form of yes, no, while the other three sections provided for a single response to one of three possible categories.

The multivariate analysis of variance was used for determining the statistical significance of the responses by the three groups relating to the subsection job skills. The purpose of the multivariate analysis was to determine if the responses by the groups were different significantly at the .05 level on the items within this section. The multivariate analysis of variance is a comparison of the means of the groups to the grand means. The research issues concern the "realness" of the differences among the population centroids.

For those items in the job skills subsection which were found to have a significant F-ratio, Scheffe's S method was employed. This procedure identified the relationships among the groups studied as related to the specific item response.

The Kruskal-Wallis (nonparametric statistic) was employed for the job knowledges, behaviors, and basic skills subsections of the instrument used. In this case the respondents chose from one of three responses: essential, desirable, and unnecessary. This one-way analysis of variance by ranks provided a test of the null hypothesis that k independent samples were drawn from k identically distributed populations. Each item in each of the three subsections was treated as a separate entity for the treatment of the data.

Research Hypotheses

The hypotheses for this study were:

There will be no differences in the responses by job incumbents from one locality to another, as related to:

a. job skills indicated on the task inventory analysis
b. job knowledges indicated on the task inventory analysis
c. behaviors indicated on the task inventory analysis
d. basic skills indicated on the task inventory analysis.

Summary

The procedure required the delineation of occupations to be included prior to the actual study of responses by job incumbents. The delineation of occupations was

accomplished through the perceptions of directors of area vocational programs. To accomplish this an instrument was developed, pilot-tested, and administered to twenty-eight directors in the State of Indiana. Frequency of response on the opinionnaire provided the occupations on either end of the continuum.

The major aspect of the study included job incumbents' responses from two sites in Indiana and the utilization of responses by job incumbents who were surveyed by Ingham Intermediate School District in Michigan. The survey instrument was composed of four sections: job skills, job knowledges, behaviors, and basic skills.

A total of forty-five surveys for each occupation, fifteen per site, with not more than one survey from any one business comprised the sample. Each job incumbent had a minimum of one year's experience with not more than five years' experience.

Included in this chapter were the hypotheses developed for the study.

CHAPTER IV

PRESENTATION AND ANALYSIS OF THE DATA

The purpose of this chapter is to present the data, and to analyze the data in respect to the overall objective. This major objective was to determine for potential use by administrators of local educational agencies indicators of the extent that local task inventory surveys for entry-level skills in vocational education of one occupational area are similar or dissimilar from those of the same occupational area in another geographical area. Three questions were raised regarding this major objective as related to the procedure adopted:

1. What occupations do directors of area vocational programs perceive as most likely to produce similar responses by job incumbents on a task inventory survey regardless of the location within a region?

2. What occupations do directors of area vocational programs perceive as least likely to produce similar responses by job incumbents on a task inventory survey regardless of the location within a region?

3. Are the responses of job incumbents to the same task inventory similar enough to permit utilization of results from one site to another site without duplicating the survey?

This chapter provides information from both phases of the study. The data from the first phase pertained to vocational directors and their perceptions regarding occupations. The data from the second phase concerned the major aspect of the study, specifically objective three stated above.

Phase One

Data collected regarding phase one consisted of educational and occupational information about the vocational directors and their perceptions regarding occupations as related to question one and two previously stated.

Vocational Directors

The data gathered from the twenty-seven vocational directors from a sample of twenty-eight indicated they possessed characteristics meeting the criteria established for this study. The following characteristics were determined.

All had state certification as vocational directors, four of whom had additional secondary administrative certification. Additionally, all vocational directors had previously obtained a teaching license in one of the seven major areas of specialization provided in the State of Indiana.

All respondents were full-time vocational administrators, ranging in experience in their present administrative position from two years to a high of twenty-seven. The mean was found to be six and one-half years with the median of five years. (See Figure 1.a.)

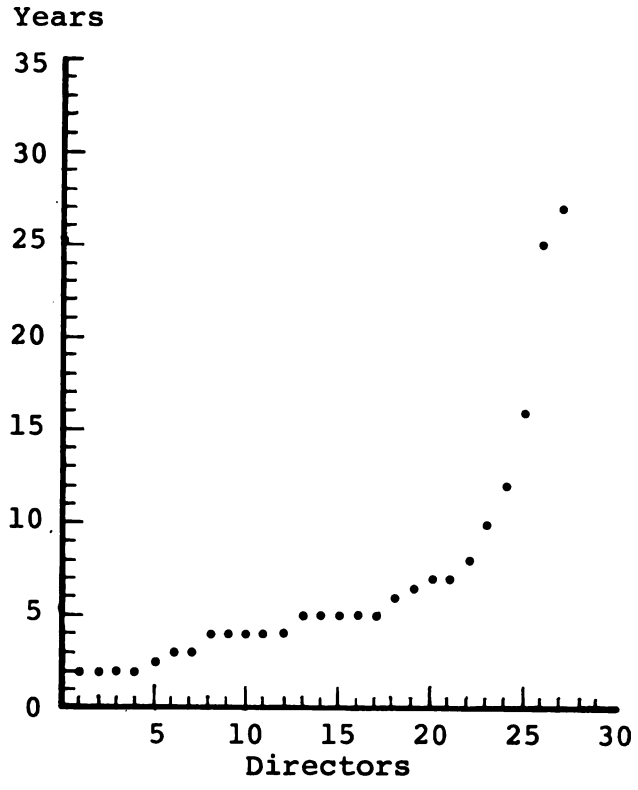

FIGURE 1.a.--Number of Years in Positions by Twenty-Seven Vocational Directors

A concern which might be raised, that of a director being new to the community thereby not capable of properly perceiving the needs of the business and industrial community, appears to be alleviated by the data gathered on the directors' characteristics. According to the data, Figure 1.b., the administrators' length of employment with the local educational agency averaged 13.15 years. The range was from a low of two years to a high of thirty-four years and the median was found to be ten years. (See Figure 1.b.) Of the five respondents with two or two and one-half years in their present position as a vocational director

(Figure 1.a.) three had prior tenure with that educational agency ranging from thirteen to seventeen years. Therefore, twenty-five of the twenty-seven exceeded the criterion of two years in the community.

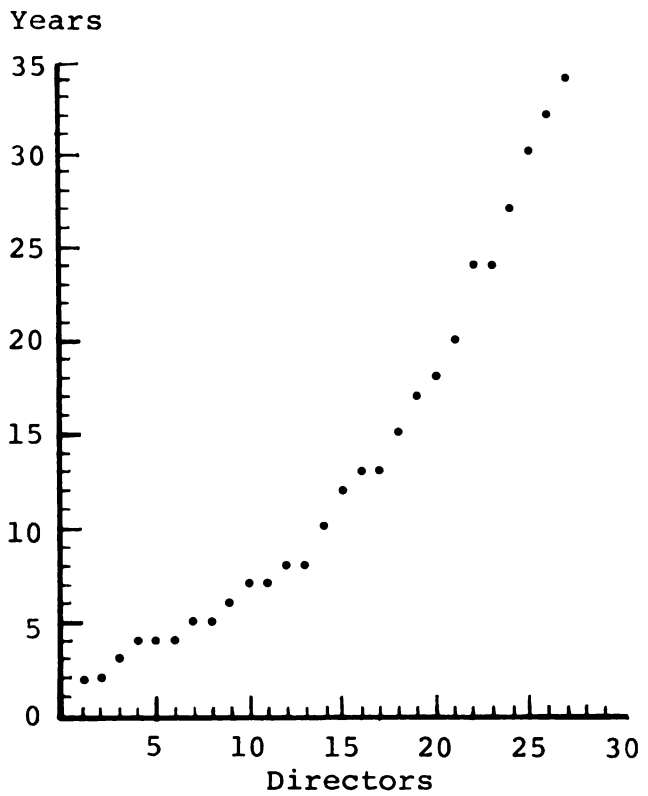

FIGURE 1.b.--Number of Years with Local Educational Agency for Each Vocational Director

Finally, all vocational administrators had a record of occupational experience, outside of the field of education. The range of experience was from two years to twenty years with the mean and median closely grouped, 8.8 and 7.5 respectively. (See Figure 1.c.)

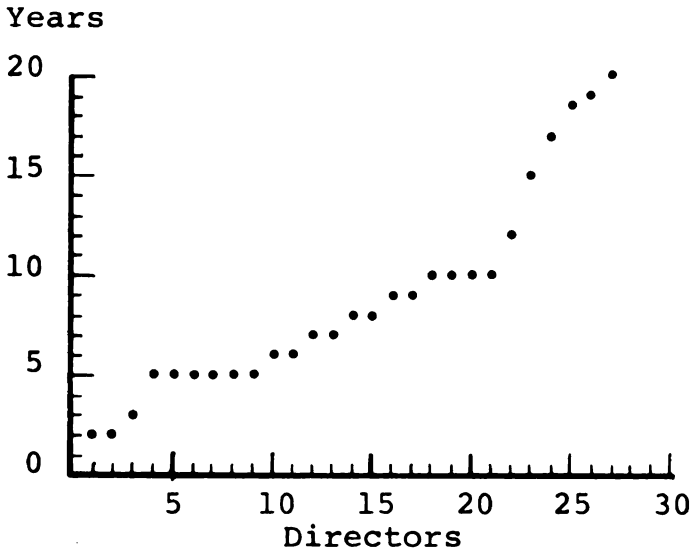

FIGURE 1.c.--Number of Years in Occupational Experience Other Than the Field of Education for Vocational Director

Perceptions of Directors of Area Vocational Programs

In order to delineate the occupations to be included in this study an instrument was provided to area vocational directors. They responded to a five-point scale where one (1) represented extremely small or no differences and five (5) represented many or significant differences regardless of the geographical location. (See Appendix A for sample copy of the instrument.) The means of the responses by the vocational directors for each of the forty-nine occupations ranged from 1.4 to 2.6 as shown in Figure 2 and subsequent data.

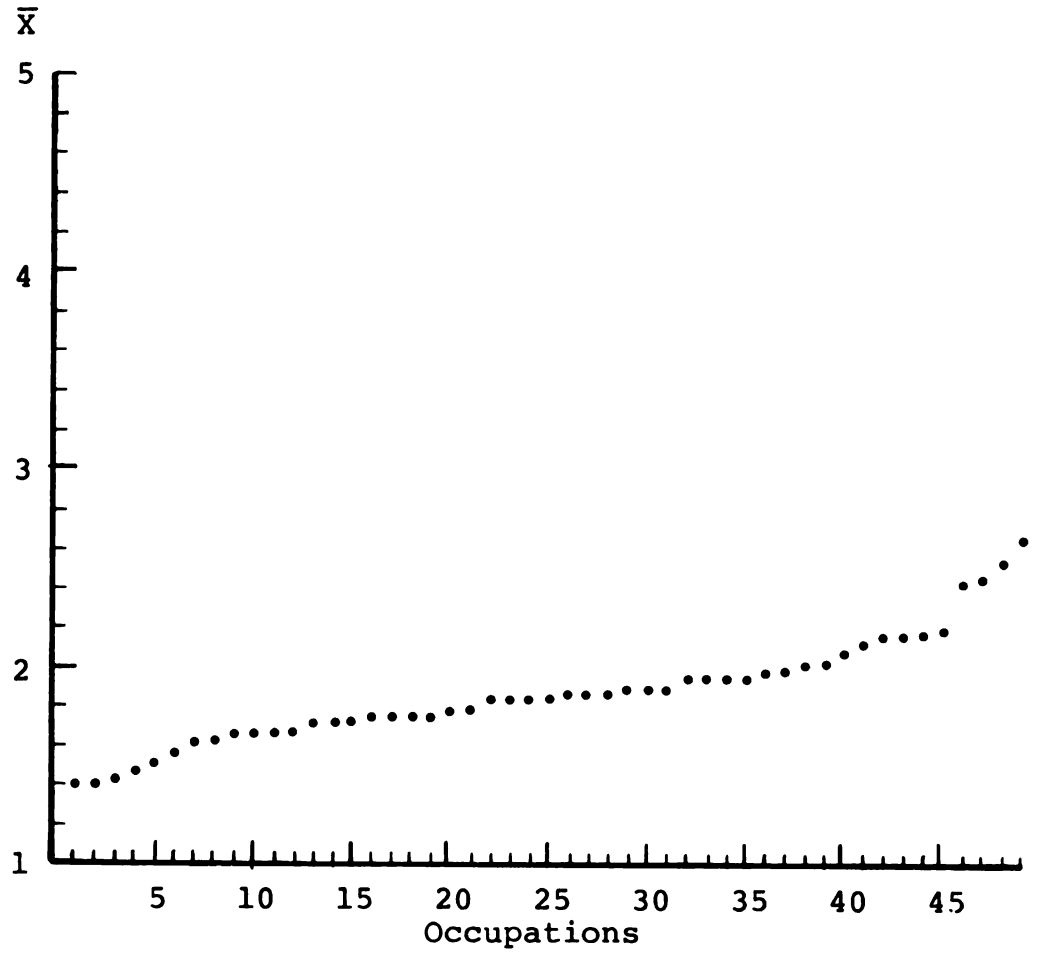

FIGURE 2.--Perceptions of Vocational Directors Regarding Similarity or Dissimilarity of Entry-Level Skills for Each of Forty-Nine Occupations at Different Sites within a Region

The following lists the OE codes, occupations, and the mean of the responses for each of the forty-nine occupations.

OE Code	Occupation	$\bar{X}$
14.020201	Keypunch Operator	1.4074*
17.03	New and Used Car Preparation	1.4074
17.1902	Duplicating Machine Operator	1.4444
17.1902	Press Operator	1.4815
14.0901	Clerk-Typist	1.5185

*Occupation selected as most similar

OE Code	Occupation	$\bar{X}$
17.0302	General Mechanic	1.5926
04.16	Service Station Attendant	1.6296
17.0301	Auto Body Repair	1.6296
14.0901	General Office Clerk	1.6667
17.0901	Camera Man	1.6667
17.12	Mechanic Helper-engine	1.6667
17.0301	Auto Body Painter	1.6667
14.0901	Typist	1.7037
17.1903	Finishing Technician	1.7037
04.03	Parts Man	1.7037
07.0202	Histologic Technician	1.7407
14.0201	Unit Records Operator	1.7407
17.2302	Production Machine Operator	1.7407
17.2302	E.D.M. (Electron Discharge Machine) Operator	1.7407
07.0305	Operating Room Technician	1.7778
17.2302	Numerical Control Operator	1.7778
14.0703	Stenographer	1.8148
17.0201	Serviceman-major appliances	1.8148
17.2306	Combination Welder	1.8148
17.2302	Machinist	1.8148
17.1901	Compositor	1.8519
17.1503	Radio and Television	1.8519
17.12	Mechanic-general	1.8519
14.0104	Account Clerk	1.8889
14.0202	Computer Operator	1.8889
17.1501	Serviceman-office machines	1.8889
07.0904	Dietetic Technician	1.9259
14.0102	Bookkeeper	1.9259
17.1001	Carpenter-rough	1.9259
17.31	Service Man (marine, lawn, and recreational)	1.9259
17.1001	Carpenter-preapprentice	1.9629
17.11	Custodian	1.9629
14.0101	Account Technician	2.0000

OE Code	Occupation	$\bar{X}$
14.0702	Secretary	2.0370
14.0203	Programmer	2.0741
17.1007	Plumber-preapprentice	2.1111
17.1001	Carpenter-modular	2.1481
17.1099	Building Maintenance	2.1481
17.01	Serviceman	2.1481
14.0406	Receptionist	2.1852
04.08	Manager-Department/Division	2.4074
17.1002	Residential Electrician	2.4444**
17.1007	Plumber-repairman	2.5185
04.08	Small Business Owner	2.6296

**Occupation selected as least similar

Keypunch Operator and New and Used Car Preparation had Identical means of 1.4074. The choice of Keypunch Operator was determined through a flip of a coin.

Although Small Business Owner and Plumber Repairman had means larger than the Residential Electrician, the Small Business Owner did not provide the opportunity of choosing small, medium, and large businesses for each site. Further, it was discovered that the data for Plumber Repairman for the Michigan site were not available; therefore, the Residential Electrician, OE Code 17.1002, was chosen as the second occupation for the study.

A test for significance of the difference between means of matched groups was computed, and the result indicated a significant difference at the .05 level for the two occupations chosen.

Phase Two

The major focus of data and data anlysis for the study fell into the second phase, that information which pertained to job incumbents' responses. This section is organized around five key areas of the data: around the two occupations, each with four subsections, an overview of each of the occupations, an analysis between occupations, and an analysis within each of the occupations.

Keypunch Occupation

The data about the keypunch occupation were gathered from the respondents at each of three sites. The instruments were structured so that the data were collected, and subsequently analyzed, in four subareas: job skills, job knowledges, behaviors, and basic skills.

Job Skills for Keypunch Occupation. The job skills subarea consisted of eighty-three items grouped into twelve categories. The twelve categories with the number of items in each were as follows:

Category	Number of Items
A. Keypunching	11
B. Verifying	5
C. Sorting	8
D. Collating	9
E. Interpreting	5
F. Reproducing	9
G. Handling other data processing operations	12

Category	Number of Items
H. Handling filing and storage operations	3
I. Operating the computer system	6
J. Programming	12
K. Supervising data processing employees	2
L. Planning and scheduling	1

A graphic presentation of the data, Figure 3, shows the eighty-three items according to the level of significance of the responses between the three sites and the twelve categories.

The number of items in relationship to the number of respondents necessitated an arbitrary grouping of the data for the multivariate analysis. Keypunching, verifying, and sorting were included in the first group. The multivariate test of equality of mean vectors for the above group provided a p value of .0313. The remaining groups were not significant at the .05 level. Item analysis indicated only one item, item eleven, was significantly different at the .05 level. The item that was significant at the .05 level was "To make, load, and properly use a program card utilizing the following fields: . . . e. Automatic Left Zero Fill."

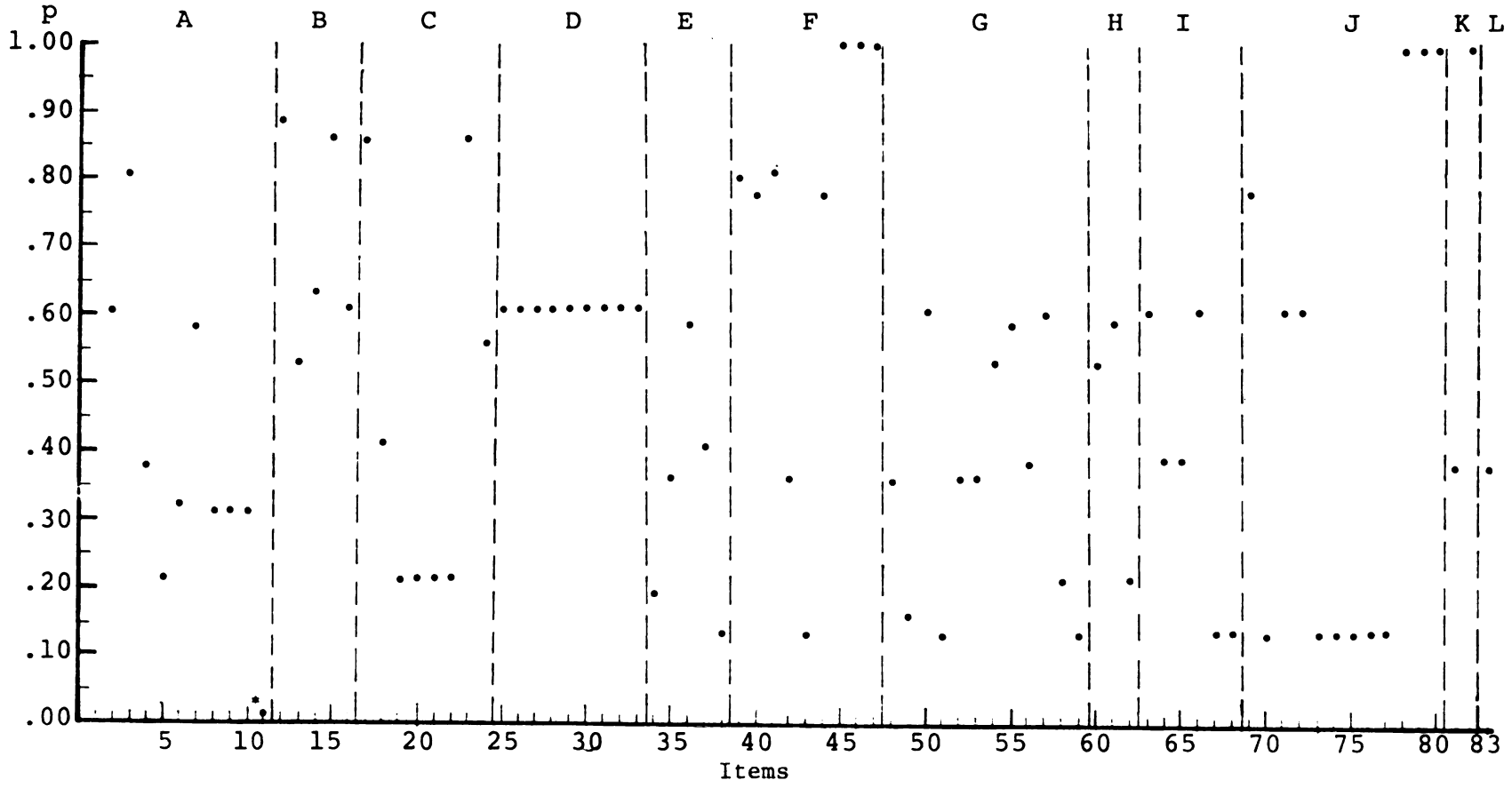

FIGURE 3.--Level of Significance for the Variance of Response Means Between Sites for Job Skills in the Keypunch Occupation for Each of the Eighty-Three Items

NOTES: The asterisk (*) indicates the differences among the response means were significant at the .05 level.

Vertical broken lines indicate categories within the job skills subsection of the instrument.

A=Keypunching
B=Verifying
C=Sorting
D=Collating
E=Interpreting
F=Reproducing
G=Handling other data processing operations
H=Handling filing and storage operations
I=Operating the computer system
J=Programming
K=Supervising data processing employees
L=Planning and scheduling

Job Knowledges for Keypunch Occupation. This section consisted of four categories containing a total of seventy-eight items, three of which were found to have a p value less than .05. One of these was in the category of knowledge concerning special-purpose machines. The items for which the responses were significantly different were:

1. "to understand the planning and scheduling necessary to complete data processing jobs according to specific time schedules,"
2. "to understand the operation of unit record equipment: h. Special-purpose machines: (1) Card-to-tape converter," and
3. "to understand the operation of unit record equipment: h. Special-purpose machines: (2) Tape-to-card converter."

The four categories with the number of items in each were as follows:

Category	Number of Items
A. Knowledge of data processing	29
B. Knowledge of unit record equipment	14
C. Computer systems	15
D. Programming and systems analysis	20

A graphic presentation of the data, Figure 4, shows the seventy-eight items according to the level of significance of the responses between the three sites and the four categories.

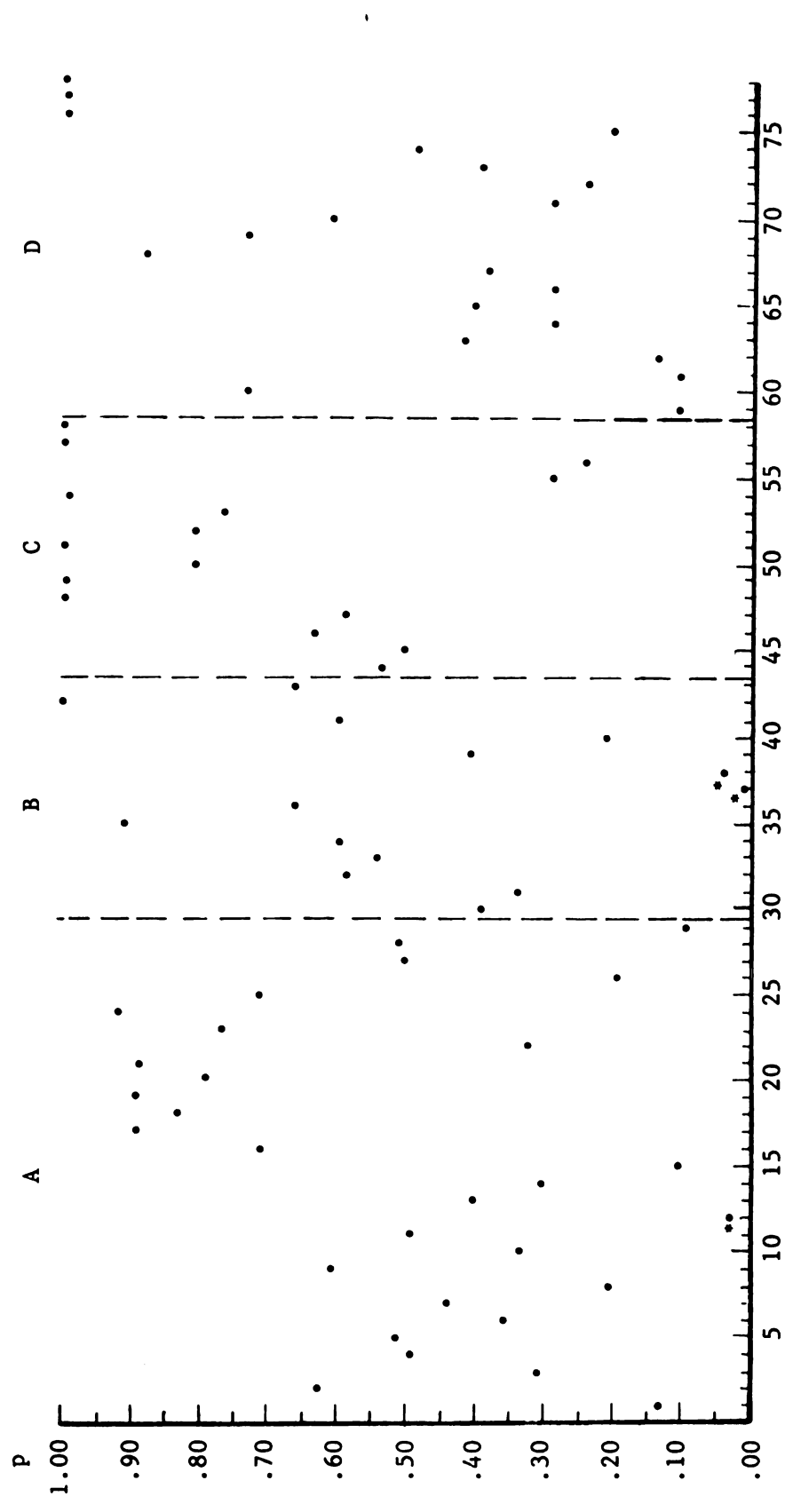

FIGURE 7.--Level of Significance for the Variance of Response Means Between Sites for Job Knowledges in the Keypunch Occupation for Each of the Seventy-Eight Items

NOTES: The asterisk (*) indicates the differences among the response means were significant at the .05 level.

Vertical broken lines indicate categories within the job knowledges subsection of the instrument.

A=Knowledge of data processing
B=Knowledge of unit record equipment
C=Computer systems
D=Programming and systems analysis

Behaviors for Keypunch Occupation. The behaviors subarea consisted of twenty-three items grouped into six categories. The six categories with the number of items in each were as follows:

Category	Number of Items
A. Exhibits neatness	4
B. Shows dependability	4
C. Shows responsibility	4
D. Behaves courteously	4
E. Gets along with people	1
F. Is willing to work	6

None of the items in the behavior subsection were found to have a p value less than the .05 level. Figure 5 provides a graphic presentation of the twenty-three items and the six categories.

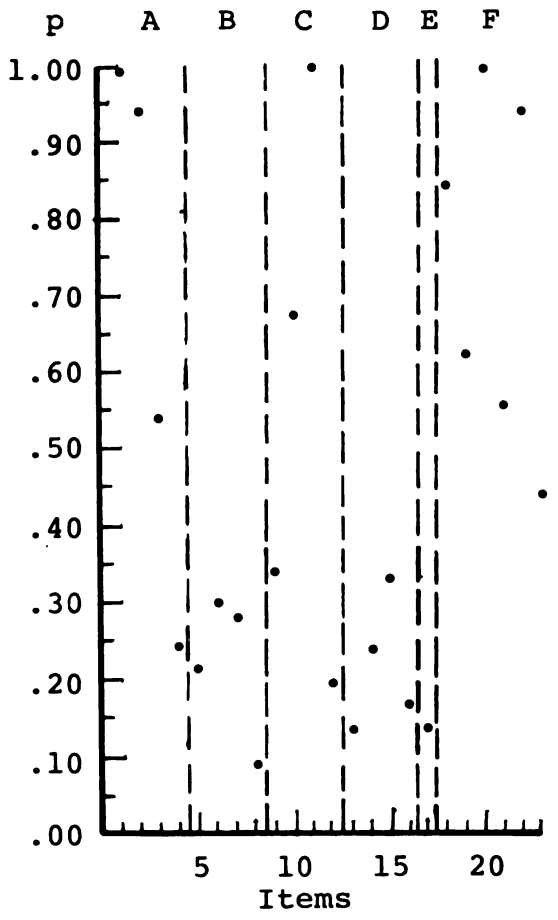

FIGURE 5.--Level of Significance for the Variance of Response Means between Sites for Job Behaviors in the Keypunch Occupation for Each of the Twenty-Three Items

NOTES: Vertical broken lines indicate categories within the behaviors subsection of the instrument.
A=Exhibits neatness
B=Shows dependability
C=Shows responsibility
D=Behaves courteously toward
E=Gets along with people
F=Is willing to work

Basic Skills for Keypunch Occupation. This subarea of the instrument contained six items, none of which were found to be significant at the .05 level. Figure six presents a graphic representation according to the level of significance of the responses between the three sites.

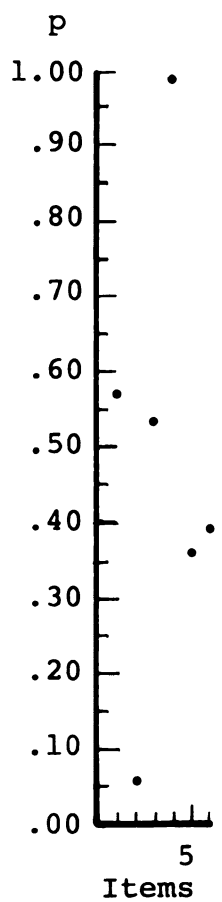

FIGURE 6.--Level of Significance for the Variance of Response Means between Sites for Basic Skills in the Keypunch Occupation for Each of the Six Items

Residential Electrical Occupation

The data about the residential electrical occupation were gathered from the respondents at each of three sites. The instruments were structured so that the data were collected, and subsequently analyzed, in four subareas: job skills, job knowledges, behaviors, and basic skills.

Job Skills for Residential Electrical Occupation. The job skills subarea consisted of thirty-four items; seven were found to have a p value less than .05. The items for which the responses were significantly different were:

1. "ability to make changes in existing circuits and redraw prints accordingly when advantageous,"
2. "use of remote or relay controls, timers, pressure switches, flow switches, thermo control, etc.,"
3. "trouble shooting electrical, electronic or mechanical difficulties in circuits or machines,"
4. "computing load, resistance, voltage, and power in A.C. and D.C. circuits,"
5. "application of all electrical and electronic devices such as resistors, condensors, transformers, coils, vacuum tubes, solid state devices, transistors, F.E.T.'s, S.C.R.'s, V.J.T.'s, modular integrated circuits, humidity sensors, potentiometers, thermocouples, photo cells, etc.,"
6. "function and use of tube testers, capacitor testers, audio generators, oscilloscopes, R.F. generators, signal tracers, meg-o-meters, field strength meters, etc.," and
7. "use of normal electronic, solid state, and joint industrial code symbols."

All of the above items had several commonalities; first, they all contained multiple facets and, secondly, they spanned the broader spectrum of industrial and electronic categories as well as aspects of the residential electrician.

The multivariate test of equality of mean vectors provided a p value of less than .05. (See Appendix E, Table 1.)

A graphic presentation of the data, Figure 7, shows the thirty-four items according to the level of significance of the responses between the three sites and the seven items with a p value of .05 are indicated by an asterisk.

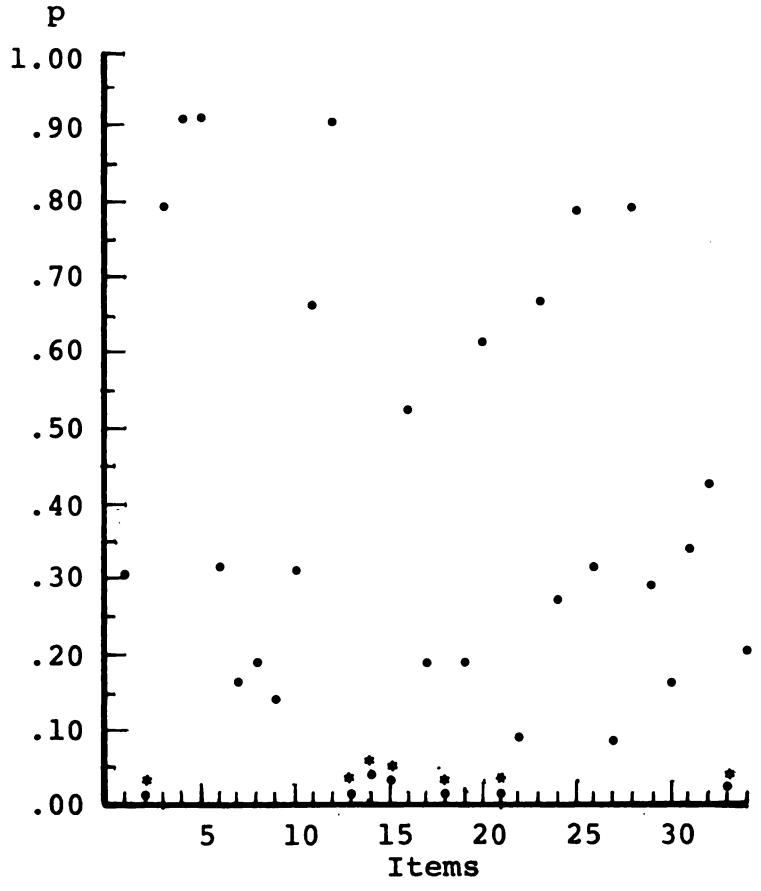

FIGURE 7.--Level of Significance for the Variance of Response Means between Sites for Job Skills in the Residential Electrical Occupation for Each of the Thirty-Four Items

Job Knowledges for Residential Electrical Occupation. This subarea was composed of forty-two items of which twelve were found to be at a level of significance less than .05. The items that were significantly different were:

1. "knowledge in the proper materials to use for soldering or plating,"
2. "union rules and trade lines of demarkation,"
3. "knows electrical, electronic, mechanical, pneumatic, and fluid theory,"
4. "has a good understanding of the types of motors and generators and the correct ones to use for ambient conditions such as heat or moisture,"
5. "the correct use of industrial electronics such as voltage regulators, ignitrons, thyrotrons, silsane motors, etc.,"
6. "knows theory and operation of induction and dielectric healing,"
7. "knows magnetic amplifiers and their use,"
8. "knows power distribution,"
9. "knows welding and welding controls,"
10. "knows static and solid state switching such as NOR-PACK,"
11. "knows first aid and correct procedures for shock treatment," and
12. "knows math involved in billing and business procedures in the service field."

Six of these were found to be items which appeared to be more related to industrial electricity or electronics than to residential electricity. One item pertained to first aid. Another item was associated to billing and business procedures. Union rules and trade lines was the content of another one of the items. The remaining three items were knowledges without apparent commonalities. (See Figure 8.)

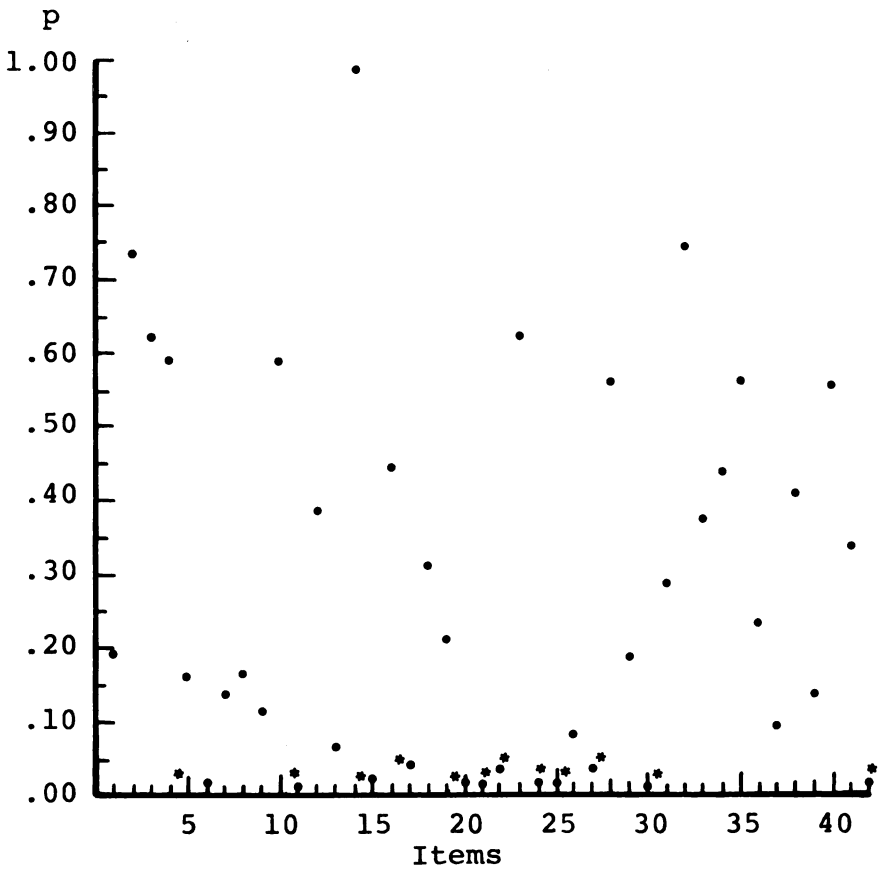

FIGURE 8.--Level of Significance for the Variance of Response Means between Sites for Job Knowledges in the Residential Electrical Occupation for Each of the Forty-Two Items

NOTE: The asterisk (*) indicates the differences among the response means were significant at the .05 level.

Behaviors for Residential Electrical Occupation. The behaviors subarea consisted of sixty-nine items grouped into twelve categories. The twelve categories with the number of items in each were as follows:

Category	Number of Items
A. Exhibits neatness	4
B. Shows dependability	4
C. Shows responsibility	7
D. Behaves courteously toward	4
E. Gets along with people	1
F. Is willing to work	9
G. Works with customers	6
H. Is discrete	12
I. Exhibits neatness	2
J. Displays dependability	1
K. Is willing to work	10
L. Demonstrates concern for safety and health hazards	9

The fourth category contained one item for which the p value was less than .05; that item was: "behaves courteously toward visitors to firm."

The eleventh category was the only other category which had items, two, at $p < .05$. These items were safety in the use of high pressure air and gas equipment and capacity for scientifically solving problems.

Overall, only three of sixty-nine items were significant at the .05 level. A graphic presentation of the

data, Figure 9, shows the sixty-nine items according to the level of significance of the responses between the three sites.

Basic Skills for the Residential Electrical Occupation. Four items from a total of sixty were found to have a p value at the .05 level of significance. The items that were significantly different were:

1. "to understand the use of decimals in measuring tolerances and clearances,"
2. "to recognize degrees of rotation (example: 10 degrees),"
3. "to interpolate and extrapolate measurement values," and
4. "to be able to use necessary hand tools at a safe and productive level."

Three of the four items dealt with mathematical and spatial concepts; decimals, degrees, and the interpolation and extrapolation of measurement values. The fourth item related to safety in the use of hand tools. (See Figure 10.)

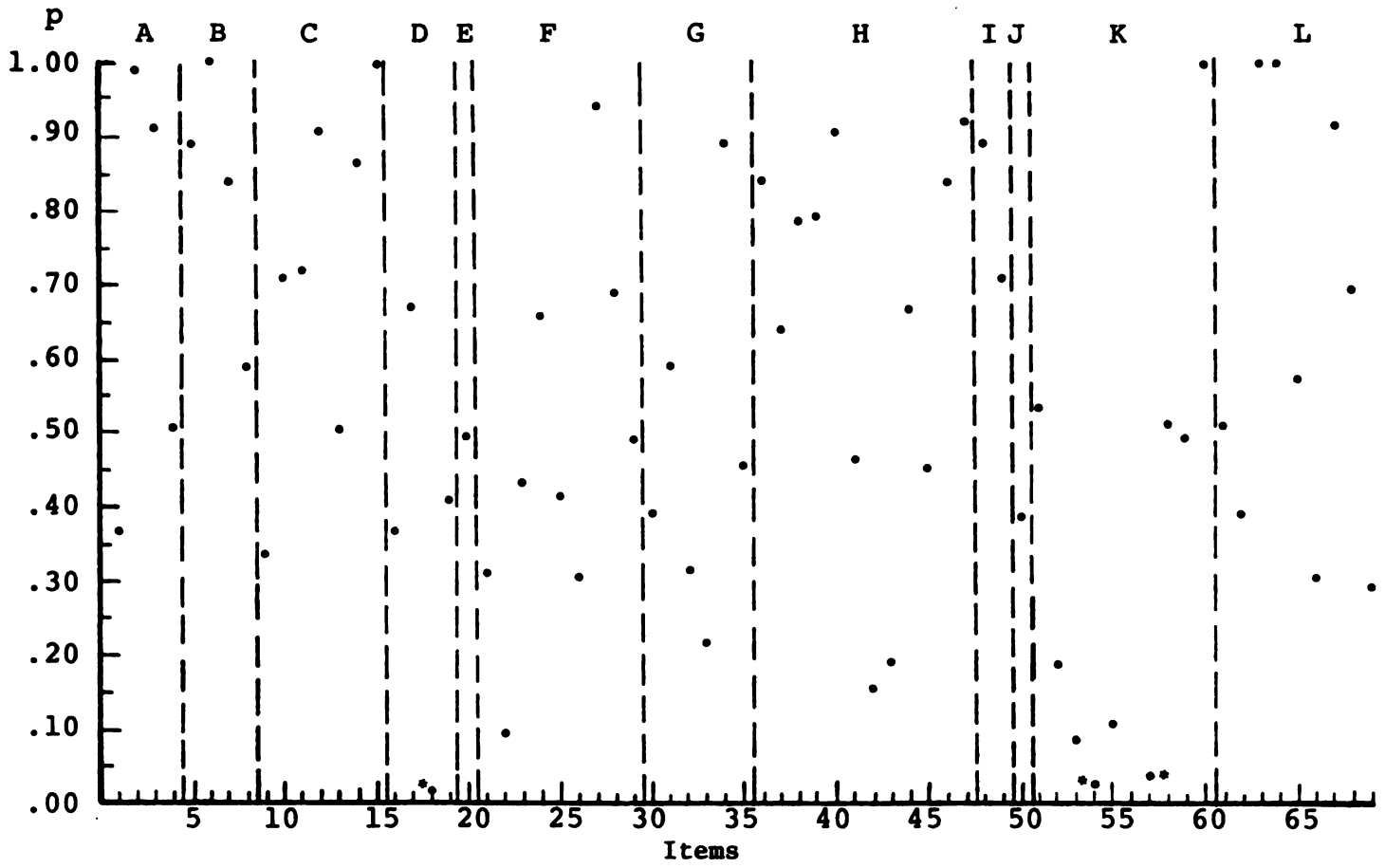

FIGURE 9.--Level of Significance for the Variance of Response Means Between Sites for Behaviors in the Residential Electrical Occupation for Each of the Sixty-Nine Items

NOTES: The asterisk (*) indicates the differences among the response means were significant at the .05 level.

Vertical broken lines indicate categories within the behaviors subsection of the instrument.

A=Exhibits neatness
B=Shows dependability
C=Shows responsibility
D=Behaves courteously toward
E=Gets along with people
F=Is willing to work
G=Works with customers
H=Is discrete
I=Exhibits neatness
J=Displays dependability
K=Is willing to work
L=Demonstrates concern for safety and health hazards

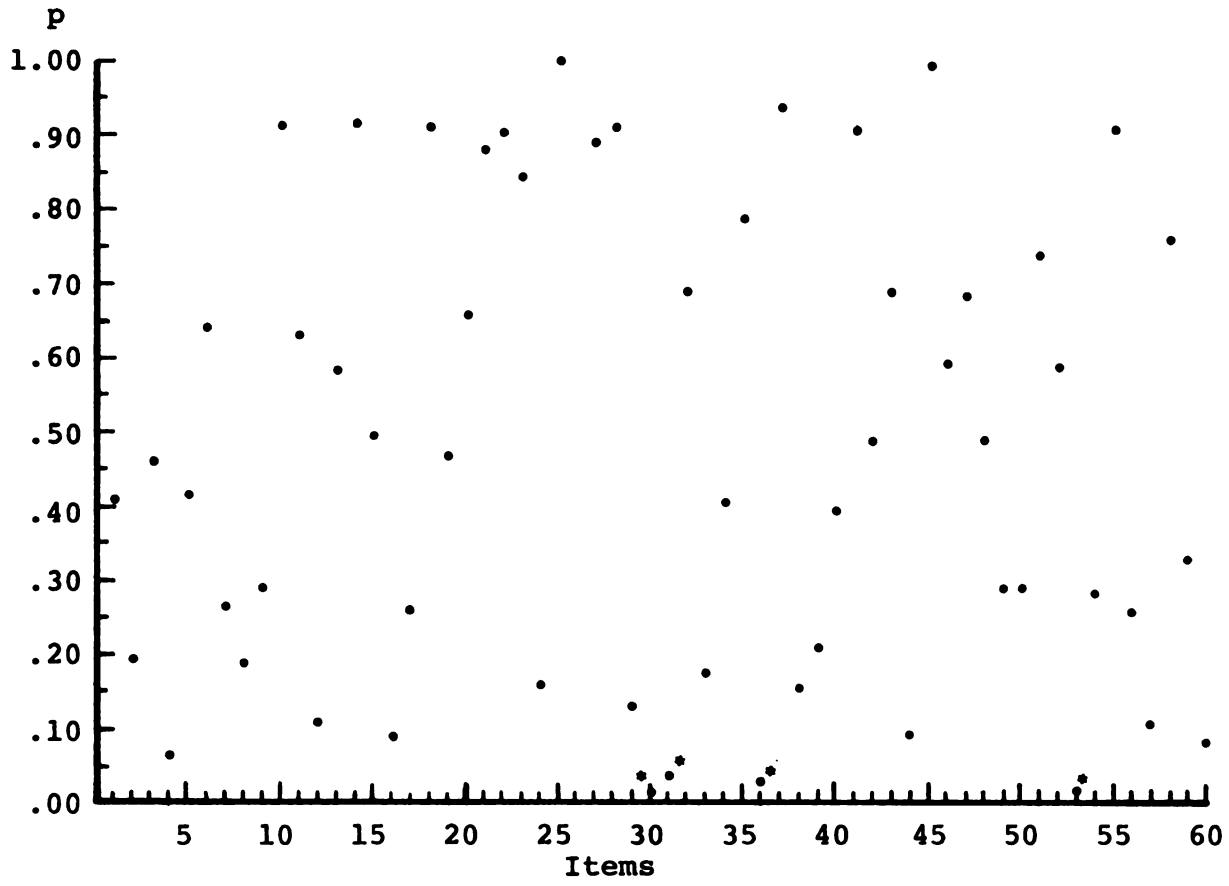

FIGURE 10.--Level of Significance for the Variance of Response Means between Sites for Basic Skills in the Residential Electrical Occupation for Each of the Sixty Items

NOTE: The asterisk (*) indicates the differences among the response means were significant at the .05 level.

Overview

When analyzing the two occupations, the keypunch area had 4 items where $p < .05$ out of 190 possible items, while the residential area provided 26 items where $p < .05$ from a possible 205 items.

Further, the overall test of equality of mean vectors established a level of significance of .0313 in the A, B, and C categories while the remaining categories were not significantly different at the .05 level.

Within the total instrument for the keypunch occupation there were four items of a possible 190 which had enough differences in responses between sites to be significant at the .05 level. One in the section regarding job skills and three in the job knowledge section.

To obtain more information regarding the item found in the job skill section which had a significant F-ratio, Scheffe's S method was employed to measure the significance of the differences between sites. The difference between Site 1 and 2 and Site 1 and 3 was significant at the .05 level; but the difference between Site 2 and 3 was not statistically significant as shown in Figure 11.

Within the 205 items included in residential electrical occupation, twenty-six items were found to have enough differences to be significant at the .05 level. Of the twenty-six, seven were in the job skills section, twelve in the job knowledges section, three in the behaviors section, and four in the basic skills section.

Item	Sites		
	1 - 2	1 - 3	3 - 2
11	X	X	

x = p .05

TABLE 1.--Summary of Comparison Among Means of the Responses by Sites for Item Eleven of Job Skills in the Keypunch Occupation Which Was Significantly Different at the .05 Level as Identified by the Multivariate Analysis

The test of equality of mean vectors for the job skills section established $p < .05$.

Scheffe's S method was employed for the seven items found to be significantly different in the job skills section to measure the differences between sites. Figure 12 provides a summary of comparisons among means for these items between the three sites.

Item	Sites		
	1 - 2	1 - 3	3 - 2
2	X	X	
13	X	X	
14	X		
15		X	
18	X	X	
21		X	
33		X	

x = p .05

TABLE 2.--Summary of Comparison Among Means of the Responses by Sites for Seven Items of Job Skills in the Residential Electrical Occupation Which Were Significantly Different at the .05 Level as Identified by the Multivariate Analysis

With regard to items which were related between sections, safety concerned with knowledge of first aid procedures for shock treatment was found to have enough differences between sites to be significant at the .05 level. However, in the section on behaviors safety regarding buildings and equipment, the job, and health of customers provided 1.000, 1.000, and .5689 p values respectively.

For those items which were established to be significantly different at the .05 level by the Kruskal-Wallis analysis, a review of the responses did not provide a pattern which indicated that one site would consistently be different from the other two. (See Appendices D and E.)

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

This was a study to acquire information about the adaptability of results of a task inventory analysis encompassing job skills, job knowledges, behaviors, and basic skills as verified by job incumbents from a local area to a regional area. It was the intent that information generated by this study might reduce the necessity of replicating task analysis surveys to secure information for curriculum development at each local educational agency.

The overall objective was to determine for potential use by administrators of local educational agencies indicators of the extent that local task inventory surveys for entry-level skills in vocational education of one occupational area were similar or dissimilar from those of the same occupational area in another geographical location. To accomplish this objective several questions were proposed for the study. The first two involved perceptions of vocational directors regarding the occupations they perceived as most likely or least likely to produce similar responses by job incumbents on a task inventory regardless of the location within a region. The third, the major focus of the study, posed the question: Are the responses of job incumbents to the same task inventory similar enough to

permit utilization of results from one site to another site without duplicating the survey?

The review of literature provided several important aspects related to the study. First, task analysis inventories have been conducted under many different names; however, the underlying purpose, identification of specific information for use in curriculum development, appeared to be the common theme.

Further, all curriculum building processes or methodology appeared to have at least one element in common. That element, normally listed as a step in the process, was the identification of content as one of the antecedents necessary for decision making in curriculum development.

Also, current trends in vocational education regarding curriculum development tended to be toward regionalization either through data gathered as specific subject matter content, portions, or total curriculum guides to be adapted or adopted at the local level. Dissemination projects have been developed, both at state and national level, to expedite this concept.

Finally, use of task analysis surveys alone was not considered curriculum; rather it was viewed as a portion of the information needed regarding content, to be used as a tool in the development of curriculum.

Procedure

The procedure required the delineation of two occupations prior to the actual study of responses by job

incumbents. The delineation of occupations was accomplished through the perceptions of local directors of area vocational programs. To accomplish this an instrument was developed, pilot tested, and administered to twenty-eight directors in the State of Indiana. Frequency of response on the opinionnaire provided the basis for the selection of the two occupations, one perceived most likely to produce similar responses by job incumbents and the other least likely to produce similar responses.

The major aspect of the study included responses by job incumbents from two sites in Indiana and from one site in Michigan. The site referred to as 1 in the study was Indianapolis, Indiana; site 2 was Elkhart, Indiana; and site 3 was Mason, Michigan.

Each of the two survey instruments was composed of four sections: job skills, job knowledges, behaviors, and basic skills. The instrument for the keypunch occupation contained eighty-three items in the area of job skills, seventy-eight items in job knowledges, twenty-three items in the behavior section, and six items in basic skills. The instrument for residential electrical occupation had thirty-four items in job skills, forty-two items included in the job knowledges section, sixty-eight items in the area of behaviors, and sixty basic skills items. The instrument for keypunch occupation had subdivisions within the areas of job skills, job knowledges, and behaviors which provided the opportunity to cluster items. The

instrument for residential electrical occupation had only one section, behaviors, which had subdivisions. The survey instruments, developed by Ingham Intermediate School District, were accepted on their face validity for use in this study.

Data were gathered about each of the two selected occupations. Forty-five respondents were secured for each occupation, fifteen at each of three sites, with not more than one survey (instrument) completed from any one business. Further, each job incumbent selected as a respondent was required to have a minimum of at least one year of experience and not more than five years' experience in the given occupation.

The multivariate analysis of variance was used for determining the statistical significance of the differences among the responses by the groups at the three sites relating to the entire job skills section as well as the individual items in the subsection on job skills.

For those items which were found, through the multivariate analysis, to have a significant F-ratio, Scheffe's S method was employed. This provided a further analysis of the groups and identified the significance of the difference between responses from the three sites.

The Kruskal-Wallis (nonparametric statistic) was employed for measuring the significance of the differences among the responses for the job knowledges, behaviors, and basic skills subsections of the instrument used. This

one-way analysis of variance by ranks provided a test of the null hypothesis that k independent samples were drawn from k identically distributed populations.

Summary of Findings of the Study

1. Two occupations were identified through the perceptions of local directors of area vocational programs. Keypunch occupation was perceived as likely to have the most similarities regardless of the site within a region while residential electrical occupation was perceived as an occupation likely to have the most differences.

2. The keypunch occupation had an overwhelming majority of items, 186, for which responses were not significantly different at the .05 level compared to four items which were found to be significantly different. According to the test for equality of mean vectors the first subarea of 24 items of the job skills section was significantly different at the .05 level. An item analysis for this section identified only one item which was significant at the .05 level. When Scheffe's method was employed for this item it established that there was a significant difference between sites 1 and 2 and 1 and 3; however, responses by job incumbents at site 2 and 3 were not significantly different.

3. The residential electrical occupation, although having 26 items for which responses were found to be significantly different at the .05 level, had a predominant number of items, 179, which were found not significantly different. According to the test for equality of mean

vectors the responses at each of the three sites for all items in the job skills section were significantly different at the .05 level. The item analysis identified seven items which were significant at the .05 level. Scheffe's S method, when employed for those seven items, provided the following information: three of the items did not show a significant difference regarding job incumbent's responses between sites 2 and 3; one item showed no significant difference between sites 1 and 3 and 2 and 3; and three items showed no significant difference between sites 1 and 2 and 2 and 3.

4. The first category in the instruments, job skills, provided the following findings. The responses to eighty-two of the eighty-three items in the keypunch survey were found to be not significantly different at the .05 level. Responses to twenty-seven of the thirty-four items were found not significantly different at the .05 level for the residential electrical occupation.

5. The second category in the instruments, job knowledges, provided the following findings. Responses to seventy-five of the seventy-eight items in the keypunch survey were found to be not significantly different at the .05 level; and responses to thirty of the forty-two job knowledge items in the residential electrical occupation fell into the not significantly different set.

6. The responses to all twenty-three items for the behavior section in the keypunch occupation and to sixty-six items of sixty-nine items for residential electrical occupation were found to be not significantly different at the

.05 level. A comparison of the items in the behavior category between the two occupations revealed that all twenty-three of the items in the keypunch survey were duplicated in the residential survey, and the responses to only one item were found to be significantly different at the .05 level.

7. In the section titled basic skills, none of the responses to the items in the keypunch survey were found to be significantly different while the responses to only four of sixty items were found to be significantly different for the residential electrical survey.

Conclusions

The findings related to the keypunch occupation appear to support the perceptions of the local directors of area vocational programs that this occupation was most likely to produce similar responses by job incumbents on a task inventory survey regardless of the location within a region. The hypothesis was accepted for 186 of the 190 items tested.

The residential electrical occupation was perceived as least likely to produce similar responses by job incumbents on a task inventory survey regardless of the location within a region and indeed did have more items for which the hypothesis was rejected. However, the responses on 179 of 205 were found not significantly different.

It would appear that information regarding occupations perceived by local directors of area vocational programs as most or least likely to produce similar results,

gained through task inventory surveys, could be transported from one local educational agency to another without duplicating the survey at the local site according to the responses of job incumbents.

Recommendations

It is recommended that administrators of local educational agencies utilize information from task inventory surveys developed by other educational agencies whenever possible. Specifically, it appears that those occupations which are perceived as most likely to produce similar responses by job incumbents from one site to another would be transferrable. Those occupations which are perceived as least likely to produce similar responses also appear to be transferrable.

When it has been demonstrated as in this research that task analysis can be used in one region which has been developed in another area, it still appears necessary to have local participation in the form of advisory committees, teachers, and administrators. The following are a few reasons underlying this concern.

The developmental procedure for the task analysis process utilizes primary and secondary sources to identify the items to be included in such an analysis. Therefore, it would appear the initial listing of items for the survey instrument could vary based upon the research and involvement of advisory bodies during this process. Further, as demonstrated by the data, not all items were at the same level of

congruence in terms of responses, even though they were not significantly different at the .05 level.

In view of the above a review of items within the task analysis should be undertaken by school personnel and advisory committees for several reasons. First, it is possible that additional tasks for the local business or industrial community might be identified which should probably be validated through a local survey for those specific items. The second reason would be to determine the level of congruence of responses for acceptance or rejection of items to be included in the curriculum. Finally, some of the tasks listed by such a survey may not be accepted as tasks needed when reviewed by an advisory committee.

The involvement of teachers and advisory committees at the decision making and advisory levels throughout the curriculum development or modification process should enhance both the immediate and long-range possibilities of success. A curriculum which is developed based upon a feeling of ownership would appear to stand a greater chance of being used even though some components, such as task analysis information, might be obtained outside that local system.

Another concern with the utilization of task analysis information is the potential of overmagnification of focus on "what," meaning tasks, rather than on "how-to-use" task information. A large proportion of instructors in vocational education at the secondary level are from industry rather than from traditional educational patterns established for

teachers. These individuals bring a wealth of occupational experiences to the position, and, normally, limited formal education as a basis for instructional methods. It would seem that tasks would be understood, and the focus by local or state agencies ought to be on developing competencies relating to methodology for curriculum development and teaching.

This study was concerned with occupations at both ends of a continuum ranging from most to least likely to produce the same results regardless of the location, as perceived by local directors of area vocational programs. A recommendation for continuation of this type of study is suggested for those occupations found in the center of the continuum.

A further recommendation, to enlarge upon this study, is to extend the geographical area to ascertain whether the results would be the same if it were compared to points more widely scattered. The greater geographical dispersion could include possibilities of different traditions, laws, employment conditions, and other factors affecting the practices for job performance.

Additional Observations

The author has chosen to use this section to add some reflections which cannot be factually documented through data gathered in the study. However, it seems imperative that concerns or feelings be expressed so that

others pursuing like research might gain some of the additional insights developed by the author.

One of the limitations identified as a potential weakness dealt with the instruments which were developed for each of the occupations. In analyzing the data, several concerns were brought forth pertaining to the construction of the instrument. Several of the items which were found to be significantly different at the .05 level contained words which appeared to be beyond the comprehension level expected of the job incumbents responding to the survey. Examples of the words in question were ambient, demarkation, interpolate, and extrapolate. Individuals responding to the survey were high school graduates within the past five years. With this in mind a review of several word lists including "Vocabulary for the College-Bound Student" was conducted. The words in question were found to be typically college-level word usage. It is recommended that a check be made of the reading level of the terminology used for the development of survey instruments.

Another aspect of item development unfolded while examining several of the items in the residential occupation regarding job skills for which the differences among the responses were less than the .05 level. Each of the items had multi-possibilities incorporated into them providing the potential for ambiguity as viewed by the respondent. For example, one item stated "use of remote or relay

controls, timers, pressure switches, flow switches, thermo controls, etc." This could possibly lead to the varied responses which were obtained in the data.

With regard to the items on safety, found in two sections of the residential electrical survey, there appears to be a focus by the respondents on safety of buildings, equipment, and other inanimate areas while those items pertaining to safety of the individual worker received considerably less attention. This may point up a need to review the items in the instrument as related to personal safety. Another possibility could be that job incumbents' focus on the job aspects may be so overbearing that personal safety items cannot realistically be derived from this group. If the latter statement is accepted, then identification of content in this area will need to be identified other than through survey methods. This would appear to point up the position taken earlier in this study that information provided from the task inventory survey is only one of several components to be considered in the process of curriculum development.

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APPENDICES

APPENDIX A

APPENDIX A

Questionnaire for Local Directors of Area Vocational Programs

This instrument was sent to four of the thirty-two area vocational program directors identified in the State of Indiana for inclusion in this study. These four were selected at random from the list which was compiled from information obtained from the Division of Vocational Education, Department of Public Instruction in the State of Indiana. These four were not then included in the final population.

A cover letter was sent with the instrument notifying them of a telephone call which would be made to establish an appointment to pick up and discuss the instrument. The following questions were posed to each of these individuals at the time the instruments were collected:

1. Do you understand the request for this information?
2. Were the instructions clear and easy to follow?
3. Was the format convenient for ease of answering?
4. Were there any objections to information requested regarding the respondent?
5. Do you have any suggestions regarding this instrument?

Present Position _____

Is this a full-time position? _____yes _____no

Number of years in this position _____

Number of years with this LEA _____

Administrative certification held in the State of Indiana

_____ 541 - Vocational Director

_____ Other, Please specify _____

Major area of specialization prior to administrative position in vocational education

_____ 01.00 Agriculture

_____ 04.00 Distributive Education

_____ 07.00 Health Occupations

_____ 09.00 Home Economics

_____ 14.00 Office Occupations

_____ 16.00 Technical Education

_____ 17.00 Trade and Industrial Occupations

_____ Other, please specify _____

Number of years in occupational experience other than in the field of education _____.

With respect to job skills, job knowledges, behaviors (attitudes), and basic skills for each of the occupations listed below, do you feel these would be the same regardless of location? For example, would the same job skills, job knowledges, behaviors (attitudes), and basic skills be needed for entry-level skills for a photographer at Elkhart, Indiana, as would be needed at Salem, Indiana, or would they be the same at Detroit, Michigan, as in Indianapolis or Muncie, Indiana?

Please respond to the following occupations by circling the appropriate number on the scale ranging from five (5) to one (1); where five represents many or significant differences, and one (1) represents extremely small or no differences.

OE Code	Occupation	Scale				
	Management Training					
04.08	Manager-Department/Division	5	4	3	2	1
04.08	Small Business Owner	5	4	3	2	1
	Health Occupations					
07.0202	Histologic Technician	5	4	3	2	1
07.0305	Operating Room Technician	5	4	3	2	1
07.0904	Dietetic Technician	5	4	3	2	1
	BUSINESS AND VISUAL COMMUNICATIONS OCCUPATIONS					
	Secretarial and Clerical Occupations					
14.0901	Typist	5	4	3	2	1
14.0406	Receptionist	5	4	3	2	1
14.0901	General Office Clerk	5	4	3	2	1
14.0901	Clerk-Typist	5	4	3	2	1
14.0703	Stenographer	5	4	3	2	1
14.0702	Secretary	5	4	3	2	1
	Bookkeeping and Accounting Occupations					
14.0102	Bookkeeper	5	4	3	2	1
14.0104	Account Clerk	5	4	3	2	1
14.0101	Account Technician	5	4	3	2	1
	Data Processing Occupations					
14.020201	Keypunch Operator	5	4	3	2	1
14.0201	Unit Records Operator	5	4	3	2	1
14.0202	Computer Operator	5	4	3	2	1
14.0203	Programmer	5	4	3	2	1

	Graphic-Visual Communication Occupations					
17.1902	Duplicating Machine Operator	5	4	3	2	1
17.1902	Press Operator	5	4	3	2	1
17.1903	Finishing Technician	5	4	3	2	1
17.0901	Camera Man	5	4	3	2	1
17.1901	Compositor	5	4	3	2	1

CONSTRUCTION AND MAINTENANCE OCCUPATIONS

	Construction (pre-apprentice)					
17.1002	Residential Electrician	5	4	3	2	1
17.1001	Carpenter-modular	5	4	3	2	1
17.1001	Carpenter-rough	5	4	3	2	1
17.1001	Carpenter-pre-apprentice	5	4	3	2	1
17.1007	Plumber-pre-apprentice	5	4	3	2	1
17.1007	Plumber-repairman	5	4	3	2	1
	Maintenance					
17.1099	Building Maintenance	5	4	3	2	1
17.11	Custodian	5	4	3	2	1
	Heating and Air Conditioning					
17.01	Serviceman	5	4	3	2	1

ELECTRICITY-ELECTRONICS OCCUPATIONS

	Office Machines					
17.1501	Serviceman	5	4	3	2	1
	Major Appliances					
17.0201	Serviceman	5	4	3	2	1
	Electronics					
17.1503	Radio and Television	5	4	3	2	1

MACHINING AND FABRICATIONS OCCUPATIONS

	Welding					
17.2306	Combination Welder	5	4	3	2	1
	Machine and Tool Operations					
17.2302	Production Machine Operator	5	4	3	2	1
17.2302	Machinist	5	4	3	2	1
17.2302	Numerical Control Operator	5	4	3	2	1
17.2302	E.D.M. (Electron Discharge Machine) Operator .	5	4	3	2	1

TRANSPORTATION SERVICE AND REPAIR OCCUPATIONS

	Diesel Mechanic					
17.12	Mechanic Helper-Engine	5	4	3	2	1
17.12	Mechanic-General	5	4	3	2	1
	Auto Mechanics					
17.0302	General Mechanic	5	4	3	2	1
17.03	New and Used Car Preparation	5	4	3	2	1
04.16	Service Station Attendant	5	4	3	2	1
04.03	Parts Man	5	4	3	2	1
	Auto Body					
17.0301	Auto Body Repair	5	4	3	2	1
17.0301	Auto Body Painter	5	4	3	2	1
	Small Engine Repair					
17.31	Serviceman (marine, lawn, and recreational) . .	5	4	3	2	1

PLEASE MAIL BY JUNE 14, 1974

May 21, 1974

Charles E. Fields
Charles Allen Prosser
Vocational Center
4202 Charlestown Road
New Albany, Indiana 47150

Dear Mr. Fields:

As an EPDA Fellow at Michigan State University representing the State of Indiana, I am conducting a study on the "Adaptability of Locally Based Task Analysis to Curricula for Regions." In order to complete this study it is necessary to obtain perceptions of local directors of area vocational programs regarding adaptability of task analysis developed at a local area for use by other areas within a regional basis.

You have been selected as one of several to participate in the pre-testing of this instrument.

I will be contacting you by telephone regarding a time when I might collect this instrument and at that time ask for your reactions regarding this device.

It is hoped that the results of this study might have some input for the betterment of vocational education throughout the State of Indiana. If you so desire and would request the results of this study, I will be most pleased to share with you the summary and conclusions.

Sincerely,

Phillip M. Mann

STATE OF INDIANA
STATE DEPARTMENT OF PUBLIC INSTRUCTION
Dr. Harold H. Negley, Superintendent
Division of Vocational Education
120 West Market Street, 16th Floor
Indianapolis, Indiana 46204

M E M O R A N D U M

TO: Directors of Area Vocational Programs

FROM: Don K. Gentry, State Director of Vocational Education

DATE: June 7, 1974

SUBJECT: EPDA Intern, Division of Vocational Education

Phillip Mann is conducting his research study concerning a vital aspect of Vocational Education. This study relates to the adaptability of locally prepared task analysis to curricula developed at other locations as one input to curriculum development. I feel this is a significant study and could add measurably to our knowledge regarding Vocational Education in the State of Indiana.

I am requesting your support in this endeavor through your prompt action regarding the survey to be completed by the directors of area vocational programs.

MICHIGAN STATE UNIVERSITY EAST LANSING • MICHIGAN 48823

COLLEGE OF EDUCATION • ERICKSON HALL

As an EPDA Fellow at Michigan State University representing the State of Indiana, I am conducting a study on the "Adaptability of Locally Based Task Analysis to Curricula for Regions." In order to complete this study it is necessary to obtain perceptions of local directors of area vocational programs regarding adaptability of task analysis developed at a local area for use by other areas within a regional basis. The term "regions" in this study means more than one state.

It is hoped, through this study, to provide some empirical evidence to support or reject the use of task analysis inventories provided at one location for use in another location. The impact to Vocational Education could be significant regardless of the outcome; however, if the study would support this concept, such a finding could relieve the amount of time needed at the local level for this task and provide a reallocation of resources to all of the other components in curriculum development.

The number of occupations, although limiting the study, was derived by an educational agency through previously conducted task analysis surveys which is to be included in this research.

Please return this instrument in the pre-addressed enclosed envelope.

If you have any questions, please feel free to call. Area code is 317, Office - 633-4841, Home - 844-9246.

It is hoped that the results of this study might have some input for the betterment of Vocational Education throughout the State of Indiana. If you so desire and would request the results of this study, I will be most pleased to share with you the summary and conclusions.

Sincerely,

Phillip M. Mann

APPENDIX B

APPENDIX B

SUPPLEMENTAL INFORMATION REGARDING LOCAL DIRECTORS OF AREA VOCATIONAL PROGRAMS IN THE STATE OF INDIANA

Local vocational directors of area programs in the State of Indiana were asked to identify the major area of specialization prior to their administrative positions in vocational education as it relates to their teaching area in vocational education. This appeared necessary since some of the preparation for teaching vocational education requires trade experience, while other areas do not require, rather recommend, trade experience. This information would provide a basis for determining how many of these directors had prior industrial experience as required by their certification pattern.

The requirements according to the State of Indiana for the different areas of specialization for teaching vocational education are as follows: Agriculture requires two years of experience in agriculture after the age of fourteen; Distributive Education requires a minimum in occupational experience of two years of successful full-time employment in the distributive occupations or a minimum of 1,500 clock hours of approved and supervised work in the distributive field under an approved teacher-training program, or a combination equivalent thereof; Home Economics recommends that occupational work experience should be an

integral part of the background for certification, however it is not mandatory; Business and Office Education, likewise, has a recommendation but not a mandate with the recommendation providing for a minimum of 2,000 hours of paid occupational experience in the appropriate vocational field for coordinators of part-time cooperative courses and instructors of intensive laboratory subjects; the last area, that of Trade and Industrial Education, requires three years of journeyman experience above the learner level in the trade or occupation to be taught.

Since not all areas of specialization require occupational experience, another item was added to secure additional information. This item asked the directors to specify the number of years of occupational experience other than in the field of education.

With regard to the administrative certification held in the State of Indiana, two aspects were requested on this instrument. One was to identify whether they were certified under the 541 Vocational Director's Certification while the second was to designate any other certification which they held, either in addition to the 541 or in place of the 541.

The rationale for using the 541 Vocational Director's Certification as a selection criteria for inclusion into the study was that it provided a number of commonalities that appeared to be significant. The 541 certification provided a basis for having had some vocational teaching prior to administration, additional education relating to

administration of vocational education, and most of whom would have had occupational experience. The following criteria is necessary for this certification:

1. Professional endorsement for teaching vocational education will have been previously obtained.
2. The minimum endorsement for the vocational director is as follows:
    a. Sixteen semester hours of graduate credit in industrial education and/or vocational education, and
    b. Eight semester hours of graduate credit in general school administration and supervision, industrial education, and/or vocational education.

In addition they must meet the general requirements for school services personnel certificate. These include:

1. A completion of the required graduate level program for the school services area in which the endorsement is sought.
2. They must hold the advanced degree for the school service area in which endorsement is sought. This will be a master's degree in teacher education from an institution of higher education accredited to offer graduate programs in school services.

3. Have professional certification for teaching in the public elementary, junior high, or secondary schools of Indiana or specified equivalency.
4. Must be recommended by the institution in which the qualifying program has been completed.

Additionally, the professional certificate which is a necessary component for obtaining this certificate requires a permanent and valid professional teaching certificate. This includes a master's degree in a teacher education program and a minimum of three years' teaching experience.

The rationale for the number of years in the position was that it was felt that a minimum of two years with the local educational agency was necessary to be able to understand and relate the local conditions to the instrument.

APPENDIX C

APPENDIX C

SUPPLEMENTAL INFORMATION CONCERNING DEVELOPMENT OF SURVEY INSTRUMENT

In late 1971, Ingham Intermediate School District, Mason, Michigan, was funded for two research projects by the Michigan Department of Education. These projects were based upon rationale to be derived through occupational task analysis. Since the inception of these projects and the initiation of this study, an occupational task analysis was developed and administered for eighteen broad occupational groupings including forty-nine specific occupations.

The survey instrument used consisted of task statements labeled "critical incidents" for four areas: job skills, job knowledge, behaviors, and basic skills. Development of the instrument was accomplished through several steps. First, through the use of existing data, job descriptions, curriculum guides, textbooks, and experts in the occupational area, a listing of task statements were made. Next the list was reacted to by advisory groups in the business and industrial community with regard to completeness, terminology, and for inaccuracies. Finally, the instrument was administered to job incumbents in each occupational area, providing additional information.

Since this instrument has been used and found to be satisfactory, the instrument was accepted on its face validity.

APPENDIX D

APPENDIX D

TABLE I

KEYPUNCH OCCUPATION

F-RATIO FOR MULTIVARIATE TEST OF EQUALITY OF MEAN VECTORS = 1.7665
D.F. = 38. AND 48.0000 P LESS THAN .0313

Variable	Hypothesis Mean Sq	Univariate F	P Less Than
1	.0000	.0000	1.0000
2	.0222	.5000	.6101
3	.0222	.2121	.8098
4	.2000	1.0000	.3765
5	.3556	1.5556	.2230
6	.2889	1.1519	.3259
7	.0667	.5526	.5796
8	.1556	1.1667	.3213
11	1.1556	6.0667	.0049*
12	.0222	.1207	.8867
13	.0889	.6512	.5267
14	.0889	.4590	.6351
15	.0222	.1429	.8673
16	.0889	.4912	.6154
17	.0222	.1591	.8535
18	.1556	.8750	.4244
19	.2889	1.5690	.2203
23	.0222	.1429	.8673
24	.0889	.5833	.5625

* p 05

Note: Variables not listed were identical to another variable.

F-RATIO FOR MULTIVARIATE TEST OF EQUALITY OF MEAN VECTORS = .9159
D.F. = 18. AND 68.0000 P LESS THAN .5627

Variable	Hypothesis Mean Sq	Univariate F	P Less Than
25	.0222	.5000	.6101
27	.0222	.5000	.6101
34	.2667	1.6800	.1987
35	.1556	1.0426	.3615
36	.0667	.5526	.5796
37	.0889	.8750	.4244
39	.0222	.2121	.8098
40	.0222	.2593	.7729
41	.0222	.2121	.8098

F-RATIO FOR MULTIVARIATE TEST OF EQUALITY OF MEAN VECTORS = 1.0283
D.F. = 18. AND 68.0000 P LESS THAN .4416

Variable	Hypothesis Mean Sq	Univariate F	P Less Than
48	.0667	1.0500	.3590
49	.1556	1.9600	.1536
50	.0222	.5000	.6101
56	.0222	1.0000	.3765
58	.1556	1.5806	.2179
59	.0889	2.1538	.1287
60	.0889	.6512	.5267
61	.0667	.5526	.5796
62	.1556	1.5806	.2179

F-RATIO FOR MULTIVARIATE TEST OF EQUALITY OF MEAN VECTORS = 1.1910
D.F. = 12. AND 74.0000 P LESS THAN .3056

Variable	Hypothesis Mean Sq	Univariate F	P Less Than
63	.0222	.5000	.6101
65	.0667	1.0500	.3590
69	.0222	.2593	.7729
70	.0889	2.1538	.1287
81	.0222	1.0000	.3765
83	.0667	1.0500	.3590

Note: Variables not listed were identical to another variable.

TABLE II

COMPARISONS AMONG THE RESPONSES TO ITEMS BY SITES FOR SIGNIFICANT DIFFERENCES AMONG THE MEANS AT THE .05 LEVEL AS IDENTIFIED BY THE MULTIVARIATE ANALYSIS FOR JOB SKILLS IN THE KEYPUNCH OCCUPATION

Item		$\bar{x}_2$	$\bar{x}_3$	$\bar{x}_1$
11	$\bar{x}_2 = .87$	–	.14	.54*
	$\bar{x}_3 = .73$		–	.40*
	$\bar{x}_1 = .33$			–

* p .05

TABLE III

RANKING OF ITEMS FOR SUB-SECTION "JOB KNOWLEDGES" OF THE KEYPUNCH OCCUPATION BY KRUSKAL-WALLIS "ANALYSIS OF VARIANCE" WITH PERCENTAGE OF RESPONSES BY SITES AND COMPOSITE OF SITES ACCORDING TO ESSENTIAL (E), DESIRABLE (D), OR UNNECESSARY (U)

Item	Sig. Level	Site 1			Site 2			Site 3			Composite		
		E	D	U	E	D	U	E	D	U	E	D	U
78	1.0000	0.0	6.7	93.3	0.0	6.7	93.3	0.0	6.7	93.3	0.0	6.7	93.3
42	1.0000	0.0	13.3	86.7	0.0	13.3	86.7	0.0	13.3	86.7	0.0	13.3	86.7
48	1.0000	0.0	13.3	86.7	0.0	13.3	86.7	0.0	13.3	86.7	0.0	13.3	86.7
51	1.0000	0.0	13.3	86.7	0.0	13.3	86.7	0.0	13.3	86.7	0.0	13.3	86.7
57	1.0000	0.0	13.3	86.7	0.0	13.3	86.7	0.0	13.3	86.7	0.0	13.3	86.7
58	1.0000	0.0	13.3	86.7	0.0	13.3	86.7	0.0	13.3	86.7	0.0	13.3	86.7
76	0.9985	0.0	6.7	93.3	6.7	0.0	93.3	0.0	6.7	93.3	2.2	4.4	93.3
77	0.9985	0.0	6.7	93.3	6.7	0.0	93.3	0.0	6.7	93.3	2.2	4.4	93.3
49	0.9967	6.7	6.7	86.7	0.0	13.3	86.7	0.0	13.3	86.7	2.2	11.1	86.7
54	0.9967	0.0	13.3	86.7	6.7	6.7	86.7	0.0	13.3	86.7	2.2	11.1	86.7
24	0.9237	6.7	20.0	73.3	0.0	26.7	73.3	0.0	33.3	66.7	2.2	26.6	71.1
35	0.9087	0.0	40.0	60.0	13.3	20.0	66.7	0.0	46.7	53.3	4.4	35.6	60.0
17	0.8890	0.0	26.7	73.3	0.0	20.0	80.0	0.0	26.7	73.3	0.0	24.4	75.6

Item	Sig. Level	Site 1			Site 2			Site 3			Composite		
		E	D	U	E	D	U	E	D	U	E	D	U
19	0.8890	0.0	26.7	73.3	0.0	26.7	73.3	0.0	20.0	80.0	0.0	24.4	75.6
21	0.8726	0.0	26.7	73.3	0.0	33.3	66.7	6.7	26.7	66.7	2.2	28.8	68.9
68	0.8640	0.0	20.0	80.0	6.7	20.0	73.3	6.7	13.3	80.0	4.4	17.8	77.8
18	0.8279	13.3	20.0	66.7	0.0	33.3	66.7	0.0	26.7	73.3	4.4	26.6	68.9
50	0.8092	6.7	13.3	80.0	0.0	13.3	86.7	0.0	13.3	86.7	2.2	13.3	84.4
52	0.8092	6.7	13.3	80.0	0.0	13.3	86.7	0.0	13.3	86.7	2.2	13.3	84.4
20	0.7828	13.3	20.0	66.7	0.0	26.7	73.3	0.0	26.7	73.3	4.4	24.4	71.1
53	0.7647	0.0	6.7	93.3	0.0	6.7	93.3	0.0	13.3	86.7	0.0	8.8	91.1
23	0.7608	6.7	20.0	73.3	6.7	33.3	60.0	0.0	33.3	66.7	4.4	28.8	66.7
60	0.7373	0.0	6.7	93.3	6.7	6.7	86.7	0.0	6.7	93.3	2.2	6.6	91.1
69	0.7348	6.7	13.3	80.0	6.7	26.7	66.7	0.0	26.7	73.3	4.4	22.2	73.3
25	0.7170	6.7	26.7	66.7	13.3	26.7	60.0	6.7	20.0	73.3	8.8	24.4	66.7
16	0.7165	0.0	26.7	73.3	0.0	33.3	66.7	0.0	20.0	80.0	0.0	26.6	73.3
36	0.6869	0.0	26.7	73.3	6.7	6.7	86.7	0.0	26.7	73.3	2.2	20.0	77.8
43	0.6654	0.0	13.3	86.7	0.0	26.7	73.3	0.0	20.0	80.0	0.0	20.0	80.0
46	0.6367	6.7	20.0	73.3	6.7	13.3	80.0	0.0	13.3	86.7	4.4	15.6	80.0
2	0.6255	6.7	53.3	40.0	26.7	40.0	33.3	13.3	46.7	40.0	15.6	46.7	37.8

Item	Sig. Level	Site 1			Site 2			Site 3			Composite		
		E	D	U	E	D	U	E	D	U	E	D	U
70	0.6151	0.0	20.0	80.0	6.7	26.7	66.7	6.7	13.3	80.0	4.4	20.0	75.6
9	0.6112	33.3	40.0	26.7	40.0	40.0	20.0	20.0	53.3	26.7	31.1	44.4	24.4
41	0.5992	0.0	26.7	73.3	13.3	26.7	60.0	0.0	40.0	60.0	4.4	31.1	64.4
34	0.5968	13.3	26.7	60.0	20.0	26.7	53.3	20.0	40.0	40.0	17.8	31.1	51.1
32	0.5898	20.0	40.0	40.0	20.0	40.0	40.0	0.0	53.3	46.7	13.3	44.4	42.2
47	0.5800	13.3	13.3	73.3	0.0	20.0	80.0	0.0	20.0	80.0	4.4	15.6	80.0
33	0.5395	6.7	33.3	60.0	6.7	13.3	80.0	0.0	33.3	66.7	4.4	26.6	68.9
44	0.5285	0.0	46.7	53.3	20.0	26.7	53.3	0.0	33.3	66.7	6.6	35.6	57.8
5	0.5217	6.7	20.0	73.3	6.7	33.3	60.0	13.3	33.3	53.3	8.8	28.8	62.2
28	0.5115	0.0	60.0	40.0	13.3	53.3	33.3	13.3	60.0	26.7	8.8	57.8	33.3
45	0.5098	6.7	20.0	73.3	0.0	13.3	86.7	0.0	13.3	86.7	2.2	15.6	82.2
27	0.5036	0.0	33.3	66.7	13.3	33.3	53.3	20.0	26.7	53.3	11.1	31.1	57.8
4	0.4968	6.7	40.0	53.3	13.3	53.3	33.3	13.3	33.3	53.3	11.1	42.2	46.7
11	0.4959	33.3	46.7	20.0	20.0	46.7	33.3	13.3	60.0	26.7	22.2	51.1	26.6
74	0.4685	0.0	13.3	86.7	13.3	13.3	73.3	0.0	13.3	86.7	4.4	13.3	82.2
7	0.4486	26.7	33.3	40.0	20.0	20.0	60.0	26.7	40.0	33.3	24.4	31.1	44.4
63	0.4245	6.7	13.3	80.0	13.3	26.7	60.0	13.3	6.7	80.0	11.1	15.6	73.3

Item	Sig. Level	Site 1			Site 2			Site 3			Composite		
		E	D	U	E	D	U	E	D	U	E	D	U
39	0.4148	0.0	6.7	93.3	0.0	6.7	93.3	0.0	20.0	80.0	0.0	11.1	88.9
13	0.4120	13.3	33.3	53.3	13.3	40.0	46.7	0.0	33.3	66.7	8.8	35.6	55.5
65	0.4036	0.0	13.3	86.7	6.7	26.7	66.7	6.7	13.3	80.0	4.4	17.8	77.8
30	0.3916	80.0	13.3	6.7	93.3	6.7	0.0	93.3	6.7	0.0	88.9	8.8	2.2
73	0.3916	0.0	6.7	93.3	6.7	13.3	80.0	0.0	6.7	93.3	2.2	8.8	88.9
67	0.3757	6.7	13.3	80.0	13.3	26.7	60.0	6.7	13.3	80.0	8.8	17.8	73.3
6	0.3585	66.7	13.3	20.0	66.7	20.0	13.3	40.0	40.0	20.0	57.8	24.4	17.8
10	0.3410	33.3	46.7	20.0	53.3	40.0	6.7	33.3	46.7	20.0	40.0	44.4	15.6
31	0.3381	66.7	20.0	13.3	86.7	13.3	0.0	80.0	20.0	0.0	77.8	17.8	4.4
22	0.3242	6.7	26.7	66.7	13.3	33.3	53.3	6.7	13.3	80.0	8.8	24.4	66.7
3	0.3140	0.0	60.0	40.0	26.7	46.7	26.7	20.0	46.7	33.3	15.6	51.1	33.3
14	0.3104	13.3	33.3	53.3	20.0	40.0	40.0	6.7	26.7	66.7	13.3	33.3	53.3
71	0.2916	0.0	13.3	86.7	6.7	20.0	73.3	0.0	6.7	93.3	2.2	13.3	84.4
55	0.2916	6.7	20.0	73.3	0.0	6.7	93.3	0.0	13.3	86.7	2.2	13.3	84.4
64	0.2834	6.7	13.3	80.0	13.3	33.3	53.3	20.0	0.0	80.0	13.3	15.6	71.1
66	0.2812	6.7	13.3	80.0	13.3	33.3	53.3	6.7	20.0	73.3	8.8	22.2	68.9
56	0.2694	13.3	13.3	73.3	0.0	6.7	93.3	0.0	13.3	86.7	4.4	11.1	84.4
72	0.2653	0.0	13.3	86.7	6.7	26.7	66.7	0.0	13.3	86.7	2.2	17.8	80.0

Item	Sig. Level	Site 1			Site 2			Site 3			Composite		
		E	D	U	E	D	U	E	D	U	E	D	U
40	0.2110	0.0	6.7	93.3	6.7	13.3	80.0	0.0	33.3	66.7	2.2	17.8	80.0
75	0.2086	0.0	0.0	100.0	6.7	13.3	80.0	0.0	13.3	86.7	2.2	8.8	88.9
8	0.2048	46.7	13.3	40.0	26.7	20.0	53.3	60.0	13.3	26.7	44.4	15.6	40.0
26	0.1855	0.0	26.7	73.3	13.3	40.0	46.7	6.7	20.0	73.3	6.6	28.8	64.4
62	0.1428	6.7	13.3	80.0	26.7	26.7	46.7	20.0	6.7	73.3	17.8	15.6	66.7
1	0.1269	33.3	40.0	26.7	60.0	33.3	6.7	26.7	53.3	20.0	40.0	42.2	17.8
59	0.1133	0.0	0.0	100.0	6.7	20.0	73.3	0.0	20.0	80.0	2.2	13.3	84.4
15	0.1120	13.3	46.7	40.0	13.3	33.3	53.3	6.7	13.3	80.0	11.1	31.1	57.8
61	0.1076	6.7	13.3	80.0	13.3	46.7	40.0	20.0	6.7	73.3	13.3	22.2	64.4
29	0.0981	0.0	26.7	73.3	6.7	53.3	40.0	6.7	53.3	40.0	4.4	44.4	51.1
38	0.0408	0.0	13.3	86.7	0.0	0.0	100.0	6.7	26.7	66.7	2.2	13.3	84.4
12	0.0392	33.3	53.3	13.3	60.0	40.0	0.0	20.0	60.0	20.0	37.8	51.1	11.1
37	0.0185	0.0	6.7	93.3	0.0	0.0	100.0	6.7	26.7	66.7	2.2	11.1	86.7

TABLE IV

RANKING OF ITEMS FOR SUB-SECTION "BEHAVIORS" OF THE KEYPUNCH OCCUPATION BY KRUSKAL-WALLIS "ANALYSIS OF VARIANCE" WITH PERCENTAGE OF RESPONSES BY SITES AND COMPOSITE OF SITES ACCORDING TO ESSENTIAL (E), DESIRABLE (D), OR UNNECESSARY (U)

		Site 1			Site 2			Site 3			Composite		
Item	Sig. Level	E	D	U	E	D	U	E	D	U	E	D	U
11	0.9923	73.3	13.3	13.3	73.3	13.3	13.3	73.3	20.0	6.7	73.3	15.6	11.1
20	0.9893	66.7	33.3	0.0	66.7	26.7	6.7	66.7	33.3	0.0	66.7	31.1	2.2
1	0.9819	46.7	53.3	0.0	53.3	40.0	6.7	53.3	40.0	6.7	51.1	44.4	4.4
22	0.9332	13.3	53.3	33.3	26.7	33.3	40.0	26.7	33.3	40.0	24.4	37.8	37.8
2	0.9315	60.0	26.7	13.3	60.0	40.0	0.0	53.3	46.7	0.0	57.8	37.8	4.4
18	0.8475	86.7	13.3	0.0	80.0	20.0	0.0	86.7	13.3	0.0	84.4	15.6	0.0
10	0.6679	66.7	26.7	6.7	80.0	13.3	6.7	80.0	13.3	6.7	75.6	17.8	6.6
19	0.6236	73.3	20.0	6.7	80.0	20.0	0.0	86.7	13.3	0.0	80.0	17.8	2.2
21	0.5501	46.7	40.0	13.3	46.7	40.0	13.3	33.3	40.0	26.7	42.2	40.0	17.8
3	0.5441	53.3	46.7	0.0	40.0	60.0	0.0	60.0	40.0	0.0	51.1	48.9	0.0
23	0.4431	40.0	40.0	20.0	46.7	46.7	6.7	60.0	33.3	6.7	48.9	40.0	11.1
9	0.3419	86.7	13.3	0.0	100.0	0.0	0.0	86.7	13.3	0.0	91.1	8.8	0.0

Item	Sig. Level	Site 1			Site 2			Site 3			Composite		
		E	D	U	E	D	U	E	D	U	E	D	U
15	0.3258	53.3	40.0	6.7	73.3	20.0	6.7	80.0	13.3	6.7	68.9	24.4	6.6
6	0.2946	73.3	26.7	0.0	73.3	26.7	0.0	93.3	6.7	0.0	80.0	20.0	0.0
7	0.2720	60.0	40.0	0.0	60.0	40.0	0.0	86.7	6.7	6.7	68.9	28.8	2.2
4	0.2427	26.7	66.7	6.7	33.3	66.7	0.0	53.3	46.7	0.0	37.8	60.0	2.2
14	0.2295	53.3	40.0	6.7	73.3	26.7	0.0	80.0	20.0	0.0	68.9	28.8	2.2
5	0.2144	80.0	20.0	0.0	100.0	0.0	0.0	86.7	13.3	0.0	88.9	11.1	0.0
12	0.1841	93.3	6.7	0.0	93.3	6.7	0.0	73.3	26.7	0.0	86.7	13.3	0.0
16	0.1567	53.3	33.3	13.3	73.3	20.0	6.7	86.7	6.7	6.7	71.1	20.0	8.8
17	0.1283	46.7	53.3	0.0	73.3	26.7	0.0	80.0	20.0	0.0	66.7	33.3	0.0
13	0.1283	46.7	53.3	0.0	73.3	26.7	0.0	80.0	20.0	0.0	66.7	33.3	0.0
8	0.0845	46.7	40.0	13.3	46.7	13.3	40.0	80.0	13.3	6.7	57.8	22.2	20.0

TABLE V

RANKING OF ITEMS FOR SUB-SECTION "BASIC SKILLS" OF THE KEYPUNCH OCCUPATION BY KRUSKAL-WALLIS "ANALYSIS OF VARIANCE" WITH PERCENTAGE OF RESPONSES BY SITES AND COMPOSITE OF SITES ACCORDING TO ESSENTIAL (E), DESIRABLE (D), OR UNNECESSARY (U)

		Site 1			Site 2			Site 3			Composite		
Item	Sig. Level	E	D	U	E	D	U	E	D	U	E	D	U
4	0.9585	26.7	53.3	20.0	13.3	86.7	0.0	20.0	73.3	6.7	20.0	71.1	8.8
1	0.5679	33.3	26.7	40.0	33.3	53.3	13.3	26.7	40.0	33.3	31.1	40.0	28.8
3	0.5389	33.3	33.3	33.3	46.7	40.0	13.3	33.3	33.3	33.3	37.8	35.6	26.6
6	0.3916	0.0	6.7	93.3	0.0	6.7	93.3	6.7	13.3	80.0	2.2	8.8	88.9
5	0.3602	0.0	6.7	93.3	0.0	26.7	73.3	6.7	13.3	80.0	2.2	15.6	82.2
2	0.0514	0.0	26.7	73.3	20.0	46.7	33.3	6.7	46.7	46.7	8.8	40.0	51.1

APPENDIX E

APPENDIX E

TABLE I

RESIDENTIAL ELECTRICAL OCCUPATION

F-RATIO FOR MULTIVARIATE TEST OF EQUALITY OF MEAN VECTORS = 3.3828
D.F. = 68. AND 18.0000 P LESS THAN .0028

Variable	Hypothesis Mean Sq	Univariate F	P Less Than
1	.2889	1.2133	.3075
2	1.2667	7.1250	.0022*
3	.0667	.2530	.7777
4	.0222	.0909	.9133
5	.0222	.0909	.9133
6	.1556	1.1667	.3213
7	.4222	1.8732	.1663
8	.4222	1.7273	.1902
9	.4222	2.1111	.1338
10	.2889	1.1667	.3213
11	.0889	.4118	.6652
12	.0222	.1014	.9038
13	.9556	6.2708	.0042*
14	.8222	3.5972	.0362*
15	.8667	3.8451	.0293*
16	.1556	.6533	.5256
17	.4222	1.7273	.1902
18	1.1556	7.0000	.0024*
19	.4222	1.7051	.1941
20	.0889	.4912	.6154
21	.8222	5.6304	.0069*
22	.4667	2.4915	.0950
23	.0889	.4118	.6652
24	.2889	1.3382	.2733
25	.0667	.2530	.7777
26	.2667	1.1831	.3164
27	.4222	2.5577	.0895
28	.0667	.2530	.7777
29	.2889	1.2466	.2980
30	.4667	1.9091	.1609
31	.2667	1.0909	.3453
32	.2000	.8750	.4244
33	.6222	4.0000	.0257*
34	.3556	1.6716	.2002

* p .05

TABLE II

COMPARISONS AMONG THE RESPONSES TO ITEMS BY SITES FOR SIGNIFICANT DIFFERENCES AMONG THE MEANS AT THE .05 LEVEL AS IDENTIFIED BY THE MULTIVARIATE ANALYSIS FOR JOB SKILLS IN THE RESIDENTIAL ELECTRICAL OCCUPATION

Item		$\bar{x}_1$	$\bar{x}_3$	$\bar{x}_2$
2	$\bar{x}_1$ = .67	–	.47*	.53*
	$\bar{x}_3$ = .20		–	.06
	$\bar{x}_2$ = .13			–
		$\bar{x}_1$	$\bar{x}_2$	$\bar{x}_3$
13	$\bar{x}_1$ = .53	–	.40*	.46*
	$\bar{x}_2$ = .13		–	.07
	$\bar{x}_3$ = .07			–
		$\bar{x}_1$	$\bar{x}_3$	$\bar{x}_2$
14	$\bar{x}_1$ = .73	–	.20	.47*
	$\bar{x}_3$ = .53		–	.27
	$\bar{x}_2$ = .27			–
		$\bar{x}_1$	$\bar{x}_2$	$\bar{x}_3$
15	$\bar{x}_1$ = .73	–	.13	.47*
	$\bar{x}_2$ = .60		–	.33
	$\bar{x}_3$ = .27			–

*p .05

Item		$\bar{x}_1$	$\bar{x}_2$	$\bar{x}_3$
18	$\bar{x}_1 = .60$	–	.40*	.53*
	$\bar{x}_2 = .20$		–	.13
	$\bar{x}_3 = .07$			–
		$\bar{x}_1$	$\bar{x}_2$	$\bar{x}_3$
21	$\bar{x}_1 = .47$	–	.27	.47*
	$\bar{x}_2 = .20$		–	.20
	$\bar{x}_3 = .00$			–
		$\bar{x}_1$	$\bar{x}_2$	$\bar{x}_3$
33	$\bar{x}_1 = .40$	–	.13	.40*
	$\bar{x}_2 = .27$		–	.27
	$\bar{x}_3 = .00$			–

* p 05

TABLE III

RANKING OF ITEMS FOR SUB-SECTION "JOB KNOWLEDGES" OF THE RESIDENTIAL ELECTRICAL OCCUPATION BY KRUSKAL-WALLIS "ANALYSIS OF VARIANCE" WITH PERCENTAGE OF RESPONSES BY SITES AND COMPOSITE OF SITES ACCORDING TO ESSENTIAL (E), DESIRABLE (D), OR UNNECESSARY (U)

Item	Sig. Level	Site 1			Site 2			Site 3			Composite		
		E	D	U	E	D	U	E	D	U	E	D	U
14	0.9596	26.7	53.3	20.0	26.7	46.7	26.7	26.7	46.7	26.7	26.6	48.9	24.4
32	0.7458	73.3	26.7	0.0	66.7	33.3	0.0	60.0	40.0	0.0	66.7	33.3	0.0
2	0.7373	86.7	6.7	6.7	93.3	6.7	0.0	93.3	6.7	0.0	91.1	6.6	2.2
3	0.6236	73.3	20.0	6.7	86.7	13.3	0.0	80.0	20.0	0.0	80.0	17.8	2.2
23	0.6236	6.7	20.0	73.3	0.0	13.3	86.7	0.0	20.0	80.0	2.2	17.8	80.0
4	0.5792	53.3	40.0	6.7	66.7	33.3	0.0	53.3	33.3	13.3	57.8	35.6	6.6
10	0.5784	60.0	20.0	20.0	33.3	60.0	6.7	33.3	53.3	13.3	42.2	44.4	13.3
35	0.5518	0.0	13.3	86.7	0.0	26.7	73.3	0.0	13.3	86.7	0.0	17.8	82.2
28	0.5514	6.7	40.0	53.3	20.0	40.0	40.0	0.0	53.3	46.7	8.8	44.4	46.7
40	0.5098	6.7	20.0	73.3	0.0	13.3	86.7	0.0	13.3	86.7	2.2	15.6	82.2
16	0.4475	73.3	13.3	13.3	46.7	53.3	0.0	46.7	46.7	13.3	55.5	37.8	6.6
34	0.4327	26.7	53.3	20.0	20.0	53.3	26.7	20.0	33.3	46.7	22.2	46.7	31.1

Item	Sig. Level	Site 1 E	Site 1 D	Site 1 U	Site 2 E	Site 2 D	Site 2 U	Site 3 E	Site 3 D	Site 3 U	Composite E	Composite D	Composite U
38	0.4062	6.7	26.7	66.7	0.0	26.7	73.3	0.0	13.3	86.7	2.2	22.2	75.6
12	0.3698	33.3	40.0	26.7	6.7	60.0	33.3	0.0	80.0	20.0	13.3	60.0	26.6
33	0.3654	93.3	0.0	6.7	73.3	26.7	0.0	86.7	13.3	0.0	84.4	13.3	2.2
41	0.3419	0.0	13.3	86.7	0.0	13.3	86.7	0.0	0.0	100.0	0.0	8.8	88.9
18	0.3141	73.3	26.7	0.0	93.3	6.7	0.0	86.7	13.3	0.0	84.4	15.6	0.0
31	0.2758	73.3	20.0	6.7	40.0	60.0	0.0	53.3	46.7	0.0	55.5	42.2	2.2
36	0.2372	20.0	6.7	73.3	6.7	46.7	46.7	6.7	13.3	80.0	11.1	22.2	66.7
19	0.2131	26.7	46.7	26.7	13.3	46.7	40.0	0.0	53.3	46.7	13.3	48.9	37.8
29	0.1854	80.0	6.7	13.3	73.3	26.7	0.0	46.7	46.7	6.7	66.7	26.6	6.6
1	0.1808	53.3	46.7	0.0	53.3	46.7	0.0	26.7	66.7	6.7	44.4	53.3	2.2
8	0.1672	60.0	26.7	13.3	80.0	20.0	0.0	86.7	13.3	0.0	75.6	20.0	4.4
5	0.1642	66.7	26.7	6.7	73.3	20.0	6.7	40.0	46.7	13.3	60.0	31.1	8.8
7	0.1433	66.7	20.0	13.3	40.0	46.7	13.3	73.3	26.7	0.0	60.0	31.1	8.8
39	0.1389	0.0	26.7	73.3	6.7	53.3	40.0	0.0	53.3	46.7	2.2	44.4	53.3
9	0.1051	40.0	40.0	20.0	13.3	46.7	40.0	6.7	53.3	40.0	20.0	46.7	33.3
37	0.0856	13.3	26.7	60.0	6.7	13.3	80.0	0.0	6.7	93.3	6.6	15.6	77.8
26	0.0764	73.3	13.3	13.3	33.3	46.7	20.0	26.7	60.0	13.3	44.4	40.0	15.6

Item	Sig. Level	Site 1			Site 2			Site 3			Composite		
		E	D	U	E	D	U	E	D	U	E	D	U
13	0.0557	40.0	40.0	20.0	13.3	66.7	20.0	0.0	60.0	40.0	17.8	55.5	26.6
17	0.0421	33.3	60.0	6.7	6.7	73.3	20.0	6.7	60.0	33.3	15.6	64.4	20.0
22	0.0377	0.0	53.3	46.7	0.0	20.0	80.0	0.0	13.3	86.7	0.0	28.8	71.1
27	0.0293	0.0	60.0	40.0	0.0	46.7	53.3	0.0	13.3	86.7	0.0	40.0	60.0
15	0.0198	26.7	53.3	20.0	6.7	66.7	26.7	0.0	40.0	60.0	11.1	53.3	35.6
6	0.0193	20.0	66.7	13.3	0.0	53.3	46.7	13.3	20.0	66.7	11.1	46.7	42.2
21	0.0180	13.3	46.7	40.0	0.0	53.3	46.7	0.0	13.3	86.7	4.4	37.8	57.8
20	0.0128	13.3	60.0	26.7	0.0	33.3	66.7	0.0	26.7	73.3	4.4	40.0	55.5
24	0.0128	66.7	20.0	13.3	33.3	53.3	13.3	6.7	66.7	26.7	35.6	46.7	17.8
42	0.0127	6.7	33.3	60.0	13.3	80.0	6.7	13.3	26.7	60.0	11.1	46.7	42.2
30	0.0108	80.0	6.7	13.3	73.3	26.7	0.0	26.7	60.0	13.3	60.0	31.1	8.8
25	0.0029	26.7	60.0	13.3	6.7	33.3	60.0	6.7	20.0	73.3	13.3	37.8	48.9
11	0.0003	53.3	33.3	13.3	13.3	20.0	66.7	0.0	26.7	73.3	22.2	26.6	51.1

TABLE IV

RANKING OF ITESM FOR SUB-SECTION "BEHAVIORS" OF THE RESIDENTIAL ELECTRICAL OCCUPATIONS BY KRUSKAL-WALLIS "ANALYSIS OF VARIANCE" WITH PERCENTAGE OF RESPONSES BY SITES AND COMPOSITE OF SITES ACCORDING TO ESSENTIAL (E), DESIRABLE (D), OR UNNECESSARY (U)

Item	Sig. Level	Site 1			Site 2			Site 3			Composite		
		E	D	U	E	D	U	E	D	U	E	D	U
6	1.0000	93.3	6.7	0.0	93.3	6.7	0.0	93.3	6.7	0.0	93.3	6.7	0.0
15	1.0000	86.7	13.3	0.0	86.7	13.3	0.0	86.7	13.3	0.0	86.7	13.3	0.0
63	1.0000	86.7	13.3	0.0	86.7	13.3	0.0	86.7	13.3	0.0	86.7	13.3	0.0
64	1.0000	86.7	13.3	0.0	86.7	13.3	0.0	86.7	13.3	0.0	86.7	13.3	0.0
60	1.0000	73.3	26.7	0.0	73.3	26.7	0.0	73.3	26.7	0.0	73.3	26.6	0.0
2	0.9757	60.0	33.3	6.7	53.3	46.7	0.0	53.3	46.7	0.0	55.5	42.2	2.2
27	0.9487	40.0	53.3	6.7	53.3	26.7	20.0	46.7	46.7	6.7	46.7	42.2	11.1
47	0.9237	66.7	33.3	0.0	73.3	20.0	6.7	73.3	26.7	0.0	71.1	26.6	2.2
3	0.9148	60.0	40.0	0.0	60.0	40.0	0.0	53.3	46.7	0.0	57.8	42.2	0.0
67	0.9148	40.0	60.0	0.0	46.7	53.3	0.0	40.0	60.0	0.0	42.2	57.8	0.0
12	0.9117	66.7	33.3	0.0	60.0	40.0	0.0	60.0	40.0	0.0	62.2	37.8	0.0
40	0.9095	60.0	40.0	0.0	66.7	33.3	0.0	66.7	33.3	0.0	64.4	35.6	0.0

Item	Sig. Level	Site 1 E	Site 1 D	Site 1 U	Site 2 E	Site 2 D	Site 2 U	Site 3 E	Site 3 D	Site 3 U	Composite E	Composite D	Composite U
34	0.8894	80.0	20.0	0.0	86.7	0.0	13.3	86.7	13.3	0.0	84.4	11.1	2.2
5	0.8819	73.3	26.7	0.0	80.0	20.0	0.0	80.0	20.0	0.0	77.8	22.2	0.0
48	0.8773	46.7	46.7	6.7	53.3	33.3	13.3	53.3	46.7	0.0	51.1	42.2	6.6
14	0.8619	86.7	13.3	0.0	80.0	20.0	0.0	80.0	20.0	0.0	82.2	17.8	0.0
7	0.8480	86.7	13.3	0.0	93.3	0.0	6.7	86.7	13.3	0.0	88.9	8.8	0.0
46	0.8465	66.7	33.3	0.0	60.0	33.3	6.7	66.7	33.3	0.0	64.4	33.3	2.2
36	0.8367	46.7	33.3	20.0	33.3	46.7	20.0	33.3	60.0	6.7	37.8	46.7	15.6
39	0.7875	26.7	46.7	26.7	46.7	13.3	40.0	46.7	26.7	26.7	40.0	28.8	31.1
38	0.7798	33.3	33.3	33.3	46.7	6.7	46.7	53.3	13.3	33.3	44.4	17.8	37.8
11	0.7231	66.7	33.3	0.0	73.3	20.0	6.7	80.0	20.0	0.0	73.3	24.4	2.2
10	0.7165	66.7	33.3	0.0	80.0	20.0	0.0	73.3	26.7	0.0	73.3	26.6	0.0
49	0.7033	60.0	40.0	0.0	46.7	53.3	0.0	60.0	40.0	0.0	55.5	44.4	0.0
68	0.6998	66.7	33.3	0.0	53.3	40.0	6.7	60.0	33.3	6.7	60.0	35.6	4.4
28	0.6837	46.7	53.3	0.0	66.7	20.0	13.3	46.7	46.7	6.7	53.3	40.0	6.6
17	0.6654	80.0	20.0	0.0	73.3	26.7	0.0	86.7	13.3	0.0	80.0	20.0	0.0
44	0.6623	33.3	66.7	0.0	26.7	60.0	13.3	26.7	73.3	0.0	28.8	66.7	4.4
24	0.6550	66.7	33.3	0.0	66.7	33.3	0.0	80.0	20.0	0.0	71.1	28.8	0.0

Item	Sig. Level	Site 1			Site 2			Site 3			Composite		
		E	D	U	E	D	U	E	D	U	E	D	U
37	0.6389	53.3	33.3	13.3	33.3	53.3	13.3	40.0	40.0	20.0	42.2	42.2	15.6
8	0.5949	73.3	26.7	0.0	86.7	6.7	6.7	86.7	13.3	0.0	82.2	15.6	2.2
31	0.5749	53.3	46.7	0.0	46.7	46.7	6.7	33.3	66.7	0.0	44.4	53.3	2.2
65	0.5689	80.0	20.0	0.0	86.7	13.3	0.0	93.3	6.7	0.0	86.7	13.3	0.0
51	0.5305	46.7	53.3	0.0	53.3	40.0	6.7	66.7	33.3	0.0	55.5	42.2	2.2
61	0.5160	80.0	20.0	0.0	80.0	20.0	0.0	93.3	6.7	0.0	84.4	15.6	0.0
58	0.5149	53.3	46.7	0.0	66.7	33.3	0.0	73.3	26.7	0.0	64.4	35.6	0.0
4	0.5053	33.3	66.7	0.0	60.0	33.0	6.7	46.7	46.7	6.7	46.7	48.9	4.4
13	0.5043	80.0	13.3	6.7	80.0	20.0	0.0	93.3	6.7	0.0	84.4	13.3	2.2
20	0.4918	60.0	40.0	0.0	66.7	33.3	0.0	80.0	20.0	0.0	68.9	31.1	0.0
59	0.4918	60.0	40.0	0.0	66.7	33.3	0.0	80.0	20.0	0.0	68.9	31.1	0.0
29	0.4883	40.0	60.0	0.0	66.7	26.7	6.7	53.3	40.0	6.7	53.3	42.2	4.4
41	0.4641	46.7	53.3	0.0	53.3	26.7	20.0	66.7	33.3	0.0	55.5	37.8	6.6
45	0.4540	60.0	33.3	6.7	73.3	20.0	6.7	80.0	20.0	0.0	71.1	24.4	4.4
35	0.4518	60.0	40.0	0.0	53.3	46.7	0.0	40.0	53.3	6.7	51.1	46.7	2.2
56	0.4427	53.3	46.7	0.0	53.3	46.7	0.0	73.3	26.7	0.0	60.0	40.0	0.0
23	0.4389	66.7	33.3	0.0	73.3	26.7	0.0	86.7	13.3	0.0	75.6	24.4	0.0

Item	Sig. Level	Site 1			Site 2			Site 3			Composite		
		E	D	U	E	D	U	E	D	U	E	D	U
25	0.4175	46.7	53.3	0.0	46.7	46.7	6.7	66.7	33.3	0.0	53.3	44.4	2.2
19	0.4148	80.0	20.0	0.0	93.3	6.7	0.0	93.3	6.7	0.0	88.9	11.1	0.0
30	0.3841	33.3	60.0	6.7	53.3	33.3	13.3	20.0	73.3	6.7	35.6	55.5	8.8
50	0.3759	66.7	26.7	6.7	86.7	13.3	0.0	80.0	20.0	0.0	77.8	20.0	2.2
1	0.3679	60.0	40.0	0.0	80.0	20.0	0.0	80.0	20.0	0.0	73.3	26.6	0.0
16	0.3679	66.7	33.3	0.0	66.7	33.3	0.0	86.7	13.3	0.0	73.3	26.6	0.0
62	0.3602	73.3	26.7	0.0	80.0	13.3	6.7	93.3	6.7	0.0	82.2	15.6	2.2
9	0.3419	86.7	13.3	0.0	86.7	13.3	0.0	100.0	0.0	0.0	91.1	8.8	0.0
32	0.3185	60.0	40.0	0.0	40.0	60.0	0.0	33.3	66.7	0.0	44.4	55.5	0.0
21	0.3185	40.0	60.0	0.0	66.7	33.3	0.0	60.0	40.0	0.0	55.5	44.4	0.0
66	0.3131	40.0	60.0	0.0	46.7	46.7	6.7	66.7	33.3	0.0	51.1	46.7	2.2
26	0.3007	46.7	53.3	0.0	66.7	33.3	0.0	73.3	26.7	0.0	62.2	37.8	0.0
69	0.2946	73.3	26.7	0.0	73.3	26.7	0.0	93.3	6.7	0.0	80.0	20.0	0.0
33	0.2241	40.0	60.0	0.0	66.7	26.7	6.7	33.3	60.0	6.7	46.7	48.9	4.4
43	0.1860	46.7	53.3	0.0	66.7	26.7	6.7	80.0	20.0	0.0	64.4	33.3	2.2
52	0.1727	46.7	53.3	0.0	60.0	40.0	0.0	80.0	20.0	0.0	62.2	37.8	0.0
42	0.1519	53.3	46.7	0.0	73.3	20.0	6.7	86.7	13.3	0.0	71.1	26.6	2.2

Item	Sig. Level	Site 1			Site 2			Site 3			Composite		
		E	D	U	E	D	U	E	D	U	E	D	U
55	0.1070	26.7	66.7	6.7	13.3	60.0	26.7	26.7	13.3	60.0	22.2	46.7	31.1
22	0.0970	66.7	33.3	0.0	60.0	40.0	0.0	93.3	6.7	0.0	73.3	26.6	0.0
53	0.0876	26.7	73.3	0.0	53.3	46.7	0.0	66.7	33.3	0.0	48.9	51.1	0.0
57	0.0403	26.7	73.3	0.0	13.3	73.3	13.3	20.0	26.7	53.3	20.0	57.8	22.2
54	0.0259	46.7	46.7	6.7	53.3	13.3	33.3	26.7	0.0	73.3	42.2	20.0	37.8
18	0.0203	53.3	46.7	0.0	93.3	6.7	0.0	86.7	13.3	0.0	77.8	22.2	0.0

TABLE V

RANKING OF ITEMS FOR SUB-SECTION "BASIC SKILLS" OF THE RESIDENTIAL ELECTRICAL OCCUPATION BY KRUSKAL-WALLIS "ANALYSIS OF VARIANCE" WITH PERCENTAGE OF RESPONSES BY SITES AND COMPOSITE OF SITES ACCORDING TO ESSENTIAL (E), DESIRABLE (D), OR UNNECESSARY (U)

		Site 1			Site 2			Site 3			Composite		
Item	Sig. Level	E	D	U	E	D	U	E	D	U	E	D	U
25	1.0000	60.0	40.0	0.0	60.0	40.0	0.0	60.0	40.0	0.0	60.0	40.0	0.0
45	0.9722	26.7	60.0	13.3	13.3	86.7	0.0	33.3	40.0	26.7	24.4	62.2	13.3
37	0.9391	33.3	66.7	0.0	40.0	53.3	6.7	33.3	60.0	6.7	35.6	60.0	4.4
28	0.9167	53.3	46.7	0.0	46.7	53.3	0.0	53.3	46.7	0.0	51.1	48.9	0.0
14	0.9167	46.7	53.3	0.0	53.3	46.7	0.0	53.3	46.7	0.0	51.1	48.9	0.0
10	0.9137	6.7	73.3	20.0	6.7	73.3	20.0	6.7	66.7	26.7	6.6	71.1	22.2
18	0.9117	66.7	33.3	0.0	60.0	40.0	0.0	60.0	40.0	0.0	62.2	37.8	0.0
55	0.9117	66.7	33.3	0.0	60.0	40.0	0.0	60.0	40.0	0.0	62.2	37.8	0.0
41	0.9106	20.0	73.3	6.7	26.7	66.7	6.7	33.3	53.3	13.3	26.6	64.4	15.6
22	0.9062	73.3	26.7	0.0	80.0	13.3	6.7	80.0	20.0	0.0	77.8	20.0	2.2
26	0.8844	40.0	60.0	0.0	40.0	60.0	0.0	40.0	46.7	13.3	40.0	55.5	4.4
27	0.8641	53.3	46.7	0.0	46.7	53.3	0.0	46.7	46.7	6.7	48.9	48.9	2.2

Item	Sig. Level	Site 1			Site 2			Site 3			Composite		
		E	D	U	E	D	U	E	D	U	E	D	U
21	0.8509	40.0	60.0	0.0	53.3	40.0	6.7	46.7	40.0	13.3	46.7	46.7	6.6
23	0.8459	33.3	66.7	0.0	46.7	46.7	6.7	40.0	46.7	13.3	40.0	53.3	6.6
35	0.7817	73.3	20.0	6.7	66.7	20.0	13.3	60.0	33.3	6.7	66.7	24.4	8.8
58	0.7537	0.0	60.0	40.0	13.3	46.7	40.0	0.0	53.3	46.7	4.4	53.3	42.2
51	0.7458	73.3	26.7	0.0	66.7	33.3	0.0	60.0	40.0	0.0	66.7	33.3	0.0
32	0.6846	13.3	60.0	26.7	6.7	53.3	40.0	13.3	53.3	33.3	11.1	55.5	33.3
43	0.6813	6.7	53.3	40.0	13.3	60.0	26.7	13.3	46.7	40.0	11.1	53.3	35.6
47	0.6774	40.0	53.3	6.7	60.0	26.7	13.3	40.0	53.3	6.7	46.7	44.4	8.8
20	0.6547	66.7	33.3	0.0	53.3	40.0	6.7	53.3	46.7	0.0	57.8	40.0	2.2
6	0.6460	20.0	80.0	0.0	40.0	53.3	6.7	40.0	53.3	6.7	33.3	62.2	4.4
11	0.6279	26.7	73.3	0.0	26.7	66.7	6.7	20.0	66.7	13.3	24.4	68.9	6.6
46	0.5836	73.3	26.7	0.0	86.7	13.3	0.0	73.3	20.0	6.7	77.8	20.0	2.2
52	0.5833	33.3	60.0	6.7	26.7	60.0	13.3	13.3	80.0	6.7	24.4	66.7	8.8
13	0.5689	80.0	20.0	0.0	86.7	13.3	0.0	93.3	6.7	0.0	86.7	13.3	0.0
15	0.4976	20.0	66.7	13.3	26.7	46.7	26.7	6.7	66.7	26.7	17.8	60.0	22.2
48	0.4858	20.0	80.0	0.0	20.0	53.3	26.7	20.0	66.7	13.3	20.0	66.7	13.3
42	0.4710	0.0	66.7	33.3	13.3	60.0	26.7	0.0	60.0	40.0	4.4	62.2	33.3

Item	Sig. Level	Site 1			Site 2			Site 3			Composite		
		E	D	U	E	D	U	E	D	U	E	D	U
19	0.4608	60.0	26.7	13.3	33.3	53.3	13.3	46.7	46.7	6.7	46.7	42.2	11.1
5	0.4148	86.7	13.3	0.0	66.7	33.3	0.0	80.0	20.0	0.0	77.8	22.2	0.0
3	0.4558	66.7	33.3	0.0	46.7	53.3	0.0	46.7	53.3	0.0	53.3	46.7	0.0
1	0.4148	93.3	6.7	0.0	93.3	6.7	0.0	80.0	20.0	0.0	88.9	11.1	0.0
34	0.4007	26.7	46.7	26.7	6.7	60.0	33.3	13.3	40.0	46.7	15.6	48.9	35.6
40	0.3924	33.3	66.7	0.0	26.7	53.3	20.0	26.7	46.7	26.7	28.8	55.5	15.6
59	0.3288	13.3	53.3	33.3	13.3	66.7	20.0	6.7	46.7	46.7	11.1	55.5	33.3
49	0.2859	53.3	40.0	6.7	80.0	13.3	6.7	73.3	26.7	0.0	68.9	26.6	4.4
50	0.2841	40.0	53.3	6.7	53.3	46.7	0.0	26.7	66.7	6.7	40.0	55.5	4.4
9	0.2812	60.0	40.0	0.0	33.3	60.0	6.7	46.7	53.3	0.0	46.7	51.1	2.2
54	0.2698	80.0	20.0	0.0	66.7	33.3	0.0	53.3	40.0	6.7	66.7	31.1	2.2
7	0.2528	66.7	33.3	0.0	60.0	40.0	0.0	86.7	13.3	0.0	71.1	28.8	0.0
17	0.2523	53.3	46.7	0.0	60.0	40.0	0.0	33.3	60.0	6.7	48.9	48.9	2.2
56	0.2514	53.3	40.0	6.7	40.0	53.3	6.7	26.7	53.3	20.0	40.0	48.9	11.1
39	0.2118	46.7	53.3	0.0	33.3	40.0	26.7	20.0	73.3	6.7	33.3	55.5	11.1
2	0.1903	33.3	53.3	13.3	20.0	53.3	26.7	13.3	46.7	40.0	22.2	51.1	26.6
8	0.1841	60.0	40.0	0.0	26.7	73.3	0.0	40.0	60.0	0.0	42.2	57.8	0.0

Item	Sig. Level	Site 1			Site 2			Site 3			Composite		
		E	D	U	E	D	U	E	D	U	E	D	U
33	0.1671	60.0	40.0	0.0	46.7	46.7	6.7	26.7	66.7	6.7	44.4	51.1	4.4
24	0.1561	13.3	80.0	6.7	20.0	60.0	20.0	13.3	40.0	46.7	15.6	60.0	24.4
38	0.1501	33.3	60.0	6.7	33.3	53.3	13.3	6.7	73.3	20.0	24.4	62.2	13.3
29	0.1284	40.0	53.3	6.7	20.0	66.7	13.3	13.3	60.0	26.7	24.4	60.0	15.6
57	0.1054	6.7	60.0	33.3	13.3	46.7	40.0	6.7	20.0	73.3	8.8	42.2	48.9
12	0.1046	80.0	20.0	0.0	80.0	13.3	6.7	46.7	53.3	0.0	68.9	28.8	2.2
44	0.0911	0.0	60.0	40.0	13.3	53.3	33.3	6.7	20.0	73.3	6.6	44.4	48.9
16	0.0855	13.3	73.3	13.3	6.7	40.0	53.3	6.7	53.3	40.0	8.8	55.5	35.6
60	0.0798	40.0	53.3	6.7	46.7	53.3	0.0	13.3	73.3	13.3	33.3	60.0	6.6
4	0.0565	46.7	53.3	0.0	20.0	73.3	6.7	13.3	73.3	13.3	26.6	66.7	6.6
31	0.0434	26.7	60.0	13.3	13.3	33.3	53.3	0.0	60.0	40.0	13.3	51.1	35.6
36	0.0293	26.7	60.0	13.3	13.3	66.7	20.0	0.0	53.3	46.7	13.3	60.0	26.6
53	0.0183	46.7	53.3	0.0	86.7	13.3	0.0	86.7	13.3	0.0	73.3	26.6	0.0
30	0.0052	26.7	66.7	6.7	13.3	20.0	66.7	0.0	60.0	40.0	13.3	48.9	37.8

APPENDIX F

CRITICAL INCIDENT ANALYSIS FOR

O.E. Code 14.020201

Keypunch Operator

JOB SKILLS

DEFINITION: A manipulative, physical activity that is actually performed on the job.

DIRECTION: A list of job skills needed in the occupation begins on the next page. Check each job skill you feel is an entry skill--one necessary for an entry-level position. Then indicate the approximate percentage of time you spend on this task in a 40-hour week.

Additional job skills may be listed at the end of this section.

EXPLANATION: Entry Skill

Check only if the task was required of you when you first started on the job.

CRITICAL INCIDENT ANALYSIS

Occupation: _____

JOB SKILLS	Entry Skill	Percentage of Time Spent in One Week					Office Use Only
		0-10%	11-25%	26-50%	51-75%	76%+	
KEYPUNCHING:							
1. To operate the keypunch machine:							
a. To operate the functional switches.	____	____	____	____	____	____	13001
b. To use the operating keys.	____	____	____	____	____	____	13002
2. To know how to load the cards in the hopper.	____	____	____	____	____	____	13003
3. To hand feed at the various stations.	____	____	____	____	____	____	13004
4. To be able to change the ribbon.	____	____	____	____	____	____	13005
5. To sort tasks to be keypunched.	____	____	____	____	____	____	13006
6. To make, load, and properly use a program card utilizing the following fields:							
a. Numeric	____	____	____	____	____	____	13007
b. Alphabetical	____	____	____	____	____	____	13008
c. Automatic Dup	____	____	____	____	____	____	13009
d. Automatic Skip	____	____	____	____	____	____	13010
e. Automatic Left Zero Fill	____	____	____	____	____	____	13011
VERIFYING:							
7. To operate the verifier:							
a. To operate the functional switches.	____	____	____	____	____	____	13012
b. To use the operating keys.	____	____	____	____	____	____	13013
8. To be able to make, load, and properly use the drum card for verifying the same types of fields.	____	____	____	____	____	____	13014
9. To diagnose and correct error signals as they occur and take proper action for correction:							
a. To re-punch cards.	____	____	____	____	____	____	13015
b. To punch new cards.	____	____	____	____	____	____	13016

CRITICAL INCIDENT ANALYSIS

Occupation: _____

JOB SKILLS	Entry Skills	Percentage of Time Spent in One Week					Office Use Only
		0-10%	11-25%	26-50%	51-75%	76%+	
SORTING:							
10. To perform several hand operations for preparing cards to be sorted.	____	____	____	____	____	____	13017
11. To operate the sorter:							
a. To insert cards into machine.	____	____	____	____	____	____	13018
b. To set dial for card column.	____	____	____	____	____	____	13019
c. To remove cards from pockets.	____	____	____	____	____	____	13020
d. To place cards back into machine for next sort.	____	____	____	____	____	____	13021
12. To sort a file of cards into alphabetical or numeric sequence.	____	____	____	____	____	____	13022
13. To block sort and select certain fields from the card.	____	____	____	____	____	____	13023
14. To recover from a card jam, if it occurs, remaking damaged cards and clearing the sorter of the jammed cards.	____	____	____	____	____	____	13024
COLLATING:							
15. To operate the collator:							
a. To load or feed cards into the machine.	____	____	____	____	____	____	13025
b. To unload or remove the cards from machine.	____	____	____	____	____	____	13026
16. To load the panel into the machine for the following jobs:							
a. Sequence Checking	____	____	____	____	____	____	13027
b. Merging	____	____	____	____	____	____	13028
c. Matching	____	____	____	____	____	____	13029

CRITICAL INCIDENT ANALYSIS

Occupation: _____

JOB SKILLS	Entry Skills	Percentage of Time Spent in One Week					Office Use Only
		0-10%	11-25%	26-50%	51-75%	76%+	
COLLATING: (continued)							
17. To wire the panel to:							
a. Sequence Check.	____	____	____	____	____	____	13030
b. Merge two decks of cards.	____	____	____	____	____	____	13031
c. Match cards.	____	____	____	____	____	____	13032
d. Select specified cards.	____	____	____	____	____	____	13033
INTERPRETING:							
18. To operate the interpreter.	____	____	____	____	____	____	13034
19. To properly load cards into the interpreter.	____	____	____	____	____	____	13035
20. To select the proper printing line.	____	____	____	____	____	____	13036
21. To insert a board properly into the machine.	____	____	____	____	____	____	13037
22. To wire the control panel for normal printing jobs in specified positions across the card.	____	____	____	____	____	____	13038
REPRODUCING:							
23. To operate the reproducer:							
a. To properly load cards into machine for:							
(1) Reproducing.	____	____	____	____	____	____	13039
(2) Gangpunching.	____	____	____	____	____	____	13040
(3) A combination of reproducing and gangpunching.	____	____	____	____	____	____	13041
b. To properly load the control panel into the machine.	____	____	____	____	____	____	13042

CRITICAL INCIDENT ANALYSIS

Occupation: _____

JOB SKILLS	Entry Skills	Percentage of Time Spent in One Week					Office Use Only
		0-10%	11-25%	26-50%	51-75%	76%+	
REPRODUCING: (continued)							
24. To be able to set the X-pickup brushes in the proper pickup column.	____	____	____	____	____	____	13043
25. To clear the machine of card jams if it occurs.	____	____	____	____	____	____	13044
26. To wire the panel for:							
a. Straight and offset reproducing.	____	____	____	____	____	____	13045
b. Gangpunching.	____	____	____	____	____	____	13046
c. Interspersed gangpunching.	____	____	____	____	____	____	13047
HANDLING OTHER DATA PROCESSING OPERATIONS:							
27. To operate the accounting machine:							
a. To load or feed cards into machine.	____	____	____	____	____	____	13048
b. To handle the print-outs from the machine.	____	____	____	____	____	____	13049
c. To wire the control panel for normal printing jobs.	____	____	____	____	____	____	13050
28. To operate special-purpose machines:							
a. Card-to-tape converter.	____	____	____	____	____	____	13051
b. Tape-to-card converter.	____	____	____	____	____	____	13052
c. High-speed printer.	____	____	____	____	____	____	13053
d. Related equipment.	____	____	____	____	____	____	13054
29. To prepare card layout.	____	____	____	____	____	____	13055
30. To prepare wiring diagrams of unit record control panels.	____	____	____	____	____	____	13056
31. To prepare print formats.	____	____	____	____	____	____	13057

CRITICAL INCIDENT ANALYSIS

Occupation: _____

JOB SKILLS	Entry Skills	Percentage of Time Spent in One Week					Office Use Only
		0-10%	11-25%	26-50%	51-75%	76%+	
HANDLING OTHER DATA PROCESSING OPERATIONS: (continued)							
32. To clear card jams from all of the machines.	____	____	____	____	____	____	13058
33. To be able to perform routine maintenance on machines.	____	____	____	____	____	____	13059
HANDLING FILING AND STORAGE OPERATIONS:							
34. To store punched cards for future reference.	____	____	____	____	____	____	13060
35. To retrieve punched cards from storage.	____	____	____	____	____	____	13061
36. To handle tape and disc libraries and to handle the storage procedure for them.	____	____	____	____	____	____	13062
OPERATING THE COMPUTER SYSTEM:							
37. To power up the computer and prepare it for operation.	____	____	____	____	____	____	13063
38. To power down the computer.	____	____	____	____	____	____	13064
39. To load jobs into the card reader.	____	____	____	____	____	____	13065
40. To properly change disc-packs.	____	____	____	____	____	____	13066
41. To load paper in printer with the proper form control loop.	____	____	____	____	____	____	13067
42. To set the machine up to compile programs and run simple jobs.	____	____	____	____	____	____	13068

CRITICAL INCIDENT ANALYSIS

Occupation: _____

JOB SKILLS	Entry Skills	Percentage of Time Spent in One Week 0-10%	11-25%	26-50%	51-75%	76%+	Office Use Only
PROGRAMMING:							
43. To prepare programs and develop machine instructions for processing data by means of data processing equipment.	____	____	____	____	____	____	13069
44. To make flow charts for solution of business problems.	____	____	____	____	____	____	13070
45. To "debug" programs.	____	____	____	____	____	____	13071
46. To code for programming:							
a. Prepare mathematical statement of common business problems to facilitate programming procedure.	____	____	____	____	____	____	13072
b. Translate detailed flow charts into coded machine instruction.	____	____	____	____	____	____	13073
47. To make block diagrams to specify equipment usage.	____	____	____	____	____	____	13074
48. To analyze data flow.	____	____	____	____	____	____	13075
49. To analyze systems in order to evaluate and modify existing programs.	____	____	____	____	____	____	13076
50. To test sample routines:							
a. Verify accuracy and completeness of programs by preparing sample data.	____	____	____	____	____	____	13077
b. Correct program errors by revising instructions or altering sequence of operations.	____	____	____	____	____	____	13078
51. To confer with supervisors and representatives of other departments concerned with programs.	____	____	____	____	____	____	13079
52. To analyze, revise, and rewrite programs to increase operating efficiency or to adapt to new requirements.	____	____	____	____	____	____	13080

CRITICAL INCIDENT ANALYSIS

Occupation: _____

JOB SKILLS	Entry Skills	Percentage of Time Spent in One Week					Office Use Only
		0-10%	11-25%	26-50%	51-75%	76%+	
SUPERVISING DATA PROCESSING EMPLOYEES:							
53. To supervise other data processing employees.	____	____	____	____	____	____	13081
54. To assign tasks to other data processing employees.	____	____	____	____	____	____	13082
PLANNING AND SCHEDULING:							
55. To plan data processing jobs according to specific time schedules.	____	____	____	____	____	____	13083

JOB KNOWLEDGES

DEFINITION: A mental activity; acquaintance with or understanding the job and the tasks involved; condition of being aware of something related to the job.

DIRECTION: A list of job knowledges needed in the occupation begins on the next page. Check whether you feel each knowledge is essential, desirable, or not necessary in your particular job.

Additional job knowledges may be listed at the end of this section.

CRITICAL INCIDENT ANALYSIS

Occupation: _____

JOB KNOWLEDGES	Is this knowledge-- Essential	Desirable	Unnecessary	Office Use Only
KNOWLEDGE OF DATA PROCESSING:				
1. To be familiar with data processing systems:				
a. To understand terminology used in data processing.	_____	_____	_____	13501
b. To be familiar with manual data processing.	_____	_____	_____	13502
c. To be familiar with automated data processing.	_____	_____	_____	13503
d. To be familiar with electronic data processing.	_____	_____	_____	13504
e. To understand the advantages and disadvantages of each: manual, automated, and electronic data processing systems.	_____	_____	_____	13505
2. To understand the ways in which data is recorded on data processing cards:				
a. Using card codes.	_____	_____	_____	13506
b. Planning card layout and design.	_____	_____	_____	13507
c. Designating card format with field definitions.	_____	_____	_____	13508
3. To understand the ways in which data processing cards are used:				
a. As a record of coded data.	_____	_____	_____	13509
b. As a data input device for operations.	_____	_____	_____	13510
c. As a means of filing and storing for future use.	_____	_____	_____	13511
4. To understand the planning and scheduling necessary to complete data processing jobs according to specific time schedules.	_____	_____	_____	13512
5. To understand the data processing applications possible with the system available:				
a. Accounts payable	_____	_____	_____	13513

CRITICAL INCIDENT ANALYSIS

Occupation: _____

JOB KNOWLEDGES	Is this knowledge-- Essential	Desirable	Unnecessary	Office Use Only
KNOWLEDGE OF DATA PROCESSING: (continued)				
b. Accounts receivable	_____	_____	_____	13514
c. Payroll applications	_____	_____	_____	13515
d. Budgetary reports	_____	_____	_____	13516
e. Mailings				
(1) Directories	_____	_____	_____	13517
(2) Lists	_____	_____	_____	13518
(3) Form letters	_____	_____	_____	13519
(4) Mail labels	_____	_____	_____	13520
f. Bank statements	_____	_____	_____	13521
g. Inventory control	_____	_____	_____	13522
h. Personnel reports				
(1) Time analysis	_____	_____	_____	13523
(2) Job analysis	_____	_____	_____	13524
i. Purchasing	_____	_____	_____	13525
j. Sales reports	_____	_____	_____	13526
6. To understand procedures, methods and techniques to use for supervision of data processing employees.	_____	_____	_____	13527
7. To be familiar with career opportunities in data processing:				
a. To understand the role of the data processor in business.	_____	_____	_____	13528
b. To know where to locate information on career opportunities in data processing.	_____	_____	_____	13529

CRITICAL INCIDENT ANALYSIS

Occupation: _____

JOB KNOWLEDGES	Is this knowledge-- Essential	Desirable	Unnecessary	Office Use Only
KNOWLEDGE OF UNIT RECORD EQUIPMENT:				
8. To understand the operation of unit record equipment:				
a. Keypunch machine	_____	_____	_____	13530
b. Verifier	_____	_____	_____	13531
c. Sorter	_____	_____	_____	13532
d. Collator	_____	_____	_____	13533
e. Interpreter	_____	_____	_____	13534
f. Reproducer	_____	_____	_____	13535
g. Accounting machine	_____	_____	_____	13536
h. Special-purpose machines:				
(1) Card-to-tape converter	_____	_____	_____	13537
(2) Tape-to-card converter	_____	_____	_____	13538
(3) High-speed printer	_____	_____	_____	13539
(4) Related equipment	_____	_____	_____	13540
9. To be familiar with routine maintenance of unit record equipment.	_____	_____	_____	13541
10. To know how to prepare wiring diagrams for unit record control panels.	_____	_____	_____	13542
11. To know how to prepare print formats.	_____	_____	_____	13543
COMPUTER SYSTEMS:				
12. To understand the operation of computer systems.	_____	_____	_____	13544

CRITICAL INCIDENT ANALYSIS

Occupation: _____

JOB KNOWLEDGES	Is this knowledge-- Essential	Desirable	Unnecessary	Office Use Only
COMPUTER SYSTEMS: (continued)				
13. To understand computer operations for each of the following applications:				
a. Accounts payable	____	____	____	13545
b. Accounts receivable	____	____	____	13546
c. Payroll applications	____	____	____	13547
d. Budgetary reports	____	____	____	13548
e. Mailings				
(1) Directories	____	____	____	13549
(2) Lists	____	____	____	13550
(3) Form letters	____	____	____	13551
(4) Mail labels	____	____	____	13552
f. Bank statements	____	____	____	13553
g. Inventory control	____	____	____	13554
h. Personnel reports				
(1) Time analysis	____	____	____	13555
(2) Job analysis	____	____	____	13556
i. Purchasing	____	____	____	13557
j. Sales reports	____	____	____	13558
PROGRAMMING AND SYSTEMS ANALYSIS:				
14. To understand the problem-solving necessary in handling business transactions:				
a. To understand methods and techniques for applying statistical methods to specific business problems.	____	____	____	13559

CRITICAL INCIDENT ANALYSIS

Occupation: _____

JOB KNOWLEDGES	Is this knowledge-- Essential	Desirable	Unnecessary	Office Use Only
PROGRAMMING AND SYSTEMS ANALYSIS: (continued)				
b. To know how to apply algebra and accounting mathematics to solution of business problems.	_____	_____	_____	13560
15. To be familiar with business management principles that, if put into practice, result in more efficient office operation:				
a. Flow of work	_____	_____	_____	13561
b. Responsibilities of employees	_____	_____	_____	13562
c. Authorization levels	_____	_____	_____	13563
d. Handling of privileged information	_____	_____	_____	13564
e. PERT concepts and principles	_____	_____	_____	13565
f. Movement or flow of papers and information	_____	_____	_____	13566
g. Controlling records and filing systems	_____	_____	_____	13567
16. To understand the functions of each operational area within the business organization:				
a. Management	_____	_____	_____	13568
b. Accounting	_____	_____	_____	13569
c. Production	_____	_____	_____	13570
d. Engineering	_____	_____	_____	13571
e. Sales	_____	_____	_____	13572
f. Other:	_____	_____	_____	13573
17. To understand programming languages in order to code data.	_____	_____	_____	13574

CRITICAL INCIDENT ANALYSIS

Occupation: _____

JOB KNOWLEDGES	Is this knowledge-- Essential	Desirable	Unnecessary	Office Use Only
PROGRAMMING AND SYSTEMS ANALYSIS: (continued)				
18. To understand systems in order to evaluate and modify existing programs.	_____	_____	_____	13575
19. To understand the use of flowcharting in systems analysis:				
a. To develop the logic pattern	_____	_____	_____	13576
b. To provide exposure to decision tables.	_____	_____	_____	13577
c. To provide exposure to matrixes.	_____	_____	_____	13578

BEHAVIORS

DEFINITION: The manner in which someone behaves; social conduct, attitudes, personality.

DIRECTION: A list of behaviors needed for the occupation begins on the next page. Check whether you feel each behavior is essential, desirable, or not necessary in your particular job.

Additional behaviors may be listed at the end of this section.

CRITICAL INCIDENT ANALYSIS

Occupation: _____

	BEHAVIORS	Is this behavior-- Essential	Desirable	Unnecessary	Office Use Only
	Exhibits neatness--				
1.	in handling tools and equipment.	_____	_____	_____	0001
2.	in keeping supplies in order.	_____	_____	_____	0002
3.	in the work area.	_____	_____	_____	0003
4.	in grooming and dress appropriate for the job.	_____	_____	_____	0004
	Shows dependability--				
5.	in completing work on time.	_____	_____	_____	0005
6.	in getting to work on time.	_____	_____	_____	0006
7.	in coming back from "breaks" on time.	_____	_____	_____	0007
8.	in reporting to the superivsor when there is a need to leave the work area.	_____	_____	_____	0008
	Shows responsibility--				
9.	in completing jobs assigned.	_____	_____	_____	0009
10.	in being sure any reports or records are completed.	_____	_____	_____	0010
11.	in being sure reports are forwarded to the appropriate person.	_____	_____	_____	0011
12.	in being able to interpret and follow written and verbal directions.	_____	_____	_____	0013
	Behaves courteously towards--				
13.	fellow employees.	_____	_____	_____	0016
14.	superiors.	_____	_____	_____	0017
15.	visitors to firm.	_____	_____	_____	0018
16.	customers or clients.	_____	_____	_____	0019
17.	Gets along with people.	_____	_____	_____	0020

CRITICAL INCIDENT ANALYSIS

Occupation: _____

	BEHAVIORS	Is this behavior-- Essential	Desirable	Unnecessary	Office Use Only
	Is willing to work--				
18.	with routine types of work.	_____	_____	_____	0022
19.	under time pressure.	_____	_____	_____	0025
20.	with tools, machines, and equipment.	_____	_____	_____	0023
21.	with things rather than people.	_____	_____	_____	0027
22.	alone for long periods of time.	_____	_____	_____	0028
23.	long hours if necessary to complete job.	_____	_____	_____	0029

BASIC SKILLS

DEFINITION: The ability to use mathematics, reading, writing communication and any other skills considered important in order to begin training toward an occupational goal.

DIRECTION: Place a check mark in one of the right-hand columns for each basic skill.

Additional skills you consider basic skills can be listed at the end of this section.

CRITICAL INCIDENT ANALYSIS

Occupation: _____

BASIC SKILLS	Is this skill-- Essential	Desirable	Unnecessary	Office Use Only
1. To type straight copy on an electric typewriter at a minimum of 25-30 words per minute.	_____	_____	_____	0412
2. To operate a ten-key adding machine by the "touch system."	_____	_____	_____	0475
3. To be able to read and comprehend statistical and written data.	_____	_____	_____	0404
4. To have a good command of the English language.	_____	_____	_____	0406
5. To have a basic understanding of algebra.	_____	_____	_____	0402
6. To be able to lift heavy objects.	_____	_____	_____	0476

APPENDIX G

CRITICAL INCIDENT ANALYSIS FOR

O.E. Code 17.1002

Residential Electrician (pre-apprentice)

JOB SKILLS

DEFINITION: A manipulative, physical activity that is actually performed on the job.

DIRECTION: A list of job skills needed in the occupation begins on the next page. Check each job skill you feel is an entry skill--one necessary for an entry-level position. Then indicate the approximate percentage of time you spend on this task in a 40-hour week.

Additional job skills may be listed at the end of this section.

EXPLANATION: Entry Skill

Check only if the task was required of you when you first started on the job.

CRITICAL INCIDENT ANALYSIS

Occupation: Electricity - Electronics

	JOB SKILLS	Entry Skill	Percentage of Time Spent in One Week					Office Use Only
			0-10%	11-25%	26-50%	51-75%	76%+	
1.	In reading prints, schematics, and manufacturer's specifications.	____	____	____	____	____	____	33001
2.	In ability to make changes in existing circuits and re-draw prints accordingly when advantageous.	____	____	____	____	____	____	33002
3.	In laceing, harnessing, forming, and securing conductors.	____	____	____	____	____	____	33003
4.	In using the correct symbols to indicate all the electrical or electronic components normally found in his area of the trade.	____	____	____	____	____	____	33004
5.	In using the proper grounding procedure and devices for correct operation of equipment and safety for operator.	____	____	____	____	____	____	33005
6.	In using the proper hand tools for installation of or repair of equipment.	____	____	____	____	____	____	33006
7.	In determining the correct wire size, color, and insulation factors necessary for a specific job.	____	____	____	____	____	____	33007
8.	In soldering and terminating conductors.	____	____	____	____	____	____	33008
9.	In the use of protective devices such as fuses, circuit breakers, overloads, etc.	____	____	____	____	____	____	33009
10.	In cleaning, lubricating, and burnishing electrical equipment.	____	____	____	____	____	____	33010
11.	In the use of appropriate measuring devices such as neon testers, knopp or wiggins, split cores, volt meters, ohm meters, and amp meters.	____	____	____	____	____	____	33011
12.	In preparing wire and cables for termination or splicing, using the proper devices.	____	____	____	____	____	____	33012
13.	In the use of remote or relay controls, timers, pressure switches, flow switches, thermo control, etc.	____	____	____	____	____	____	33013

CRITICAL INCIDENT ANALYSIS

Occupation: Electricity - Electronics

JOB SKILLS	Entry Skill	Percentage of Time Spent in One Week					Office Use Only
		0-10%	11-25%	26-50%	51-75%	76%+	
14. In troubleshooting electrical, electronic or mechanical difficulties in circuits or machines.	____	____	____	____	____	____	33014
15. In computing load, resistance, voltage, and power in A.C. and D.C. circuits.	____	____	____	____	____	____	33015
16. In the use of power tools such as grinders, buffers, drill presses, etc.	____	____	____	____	____	____	33016
17. In disassembling or assembling mechanical devices common to the trade.	____	____	____	____	____	____	33017
18. In the application of all electrical and electronic devices such as, resistors, condensors, transformers, coils, vacuum tubes, solid state devices, diodes, transistors, F.E.T.'s, S.C.R., U.J.T.'s, modular integrated circuits, humidity sencors, potentiometers, thermocouples, photo cells, etc.	____	____	____	____	____	____	33018
19. In repairing minor problems not requiring lab facilities.	____	____	____	____	____	____	33019
20. In the care, maintenance, and proper use of tools and equipment.	____	____	____	____	____	____	33020
21. In the functions and use of tube testers, transistor testers, capacitor testers, audio generators, Oscilloscopes, R.F. generators, signal tracers, meg-o-meters, field strength meters, etc.	____	____	____	____	____	____	33021
22. In the use of construction power tools such as cutters, benders, saws, hammers, threaders, etc.	____	____	____	____	____	____	33022
23. In planning new installations.	____	____	____	____	____	____	33023
24. In completing customer bills and receipts.	____	____	____	____	____	____	33024
25. In exhibiting the needed driving record and skills.	____	____	____	____	____	____	33025

CRITICAL INCIDENT ANALYSIS

Occupation: Electricity - Electronics

JOB SKILLS	Entry Skill	Percentage of Time Spent in One Week					Office Use Only
		0-10%	11-25%	26-50%	51-75%	76%+	
26. In meeting the public and handling service calls.	____	____	____	____	____	____	33026
27. In relating electrical, electronics, mechanical, fluidics, and pneumatics.	____	____	____	____	____	____	33027
28. In installing all forms of square ducts, rigid, E.M.T., and explosion proofing.	____	____	____	____	____	____	33028
29. In installing receptacles as specified by code, for 120V, 240V, 480V, circuits with current capacity.	____	____	____	____	____	____	33029
30. In the installation of circuits controlled from two or more points.	____	____	____	____	____	____	33030
31. In the use of all A.C., single, two, and three phase circuits.	____	____	____	____	____	____	33031
32. In fire prevention and control.	____	____	____	____	____	____	33032
33. In the use of normal electronic, solid state and joint industrial code symbols.	____	____	____	____	____	____	33034
34. In forming chassis or sub chassis using brakes, shears, knock outs, etc.	____	____	____	____	____	____	33035

JOB KNOWLEDGES

DEFINITION: A mental activity; acquaintance with or understanding the job and the tasks involved; condition of being aware of something related to the job.

DIRECTION: A list of job knowledges needed in the occupation begins on the next page. Check whether you feel each knowledge is essential, desirable, or not necessary in your particular job.

Additional job knowledges may be listed at the end of this section.

CRITICAL INCIDENT ANALYSIS

Occupation: Electricity - Electronics

	JOB KNOWLEDGES	Is this knowledge-- Essential	Desirable	Unnecessary	Office Use Only
1.	Knows Ohm's Law for A.C. and D.C. and how to apply.	_____	_____	_____	33500
2.	Employs the correct hand tools used on equipment, fittings, and hardwares.	_____	_____	_____	33501
3.	Knows the need for and the proper use of shielding and grounding.	_____	_____	_____	33502
4.	Knows the theory and proper use of testing devices common to the trade such as volt meters, ohm meters, amp meters, hand testers, tube testers, transistor testers, signal tracers, split cores, meg-o-meters, oscilloscopes.	_____	_____	_____	33503
5.	Has complete knowledge of the National, State, and Local codes regarding wire size, color, and conduit sizes and types.	_____	_____	_____	33504
6.	Knowledgeable in the proper materials to use for soldering or plating.	_____	_____	_____	33505
7.	Understands the proper procedures and safety precautions in troubleshooting.	_____	_____	_____	33506
8.	The use of power equipment in the trade and safety precautions in their use.	_____	_____	_____	33507
9.	Knows the proper use and maintenance of belts, pulleys, and bearings.	_____	_____	_____	33508
10.	The proper use of insulation and insulating materials.	_____	_____	_____	33509
11.	Union rules and trade lines of demarkation.	_____	_____	_____	33510
12.	Knows inductance, capacitance, and their reactance.	_____	_____	_____	33511
13.	Knows the theory and how to apply to all electrical and electronic devices such as condensors, coils, relays, starters, switches, timers, selonoids, vacuum tubes, solid state devices, diodes, rectifiers, humidity sensors, resistors, thermistors, thermocouples, photo cells, transducers, etc.	_____	_____	_____	33512

CRITICAL INCIDENT ANALYSIS

Occupation: Electricity - Electronics

	JOB KNOWLEDGES	Is this knowledge-- Essential	Desirable	Unnecessary	Office Use Only
14.	Is competent in the knowledge of correct cleaning and lubricating materials and devices to use.	_____	_____	_____	33513
15.	Knows electrical, electronic, mechanical, pneumatic, and fluidic theory.	_____	_____	_____	33514
16.	Knows the special hardwares of the trade and their proper uses.	_____	_____	_____	33515
17.	Has a good understanding of the types of motors and generators and the correct ones to use for ambient conditions such as heat or moisture.	_____	_____	_____	33516
18.	Knows the correct tools to use in electrical work.	_____	_____	_____	33517
19.	Knowledge of the theory of permanent and electro-magnetism.	_____	_____	_____	33518
20.	The correct use of industrial electronics such as voltage regulators, ignitrons, thyrotrons, silsane motors, etc.	_____	_____	_____	33519
21.	Knows theory and operation of induction and dielectric healing.	_____	_____	_____	33520
22.	Knows magnetic amplifiers and their use.	_____	_____	_____	33521
23.	Knows ultrasonics and its application.	_____	_____	_____	33522
24.	Knows power distribution.	_____	_____	_____	33523
25.	Knows welding and welding controls.	_____	_____	_____	33524
26.	Recognizes environmental factors that necessitate special installation such as explosion proofing, heat, or special protection.	_____	_____	_____	33525
27.	Knows static and solid state switching such as NOR-PACK.	_____	_____	_____	33526
28.	Knows pipe color codes (all types, electrical, plumbing, etc.)	_____	_____	_____	33527
29.	Knows how to read prints and identifies symbols.	_____	_____	_____	33528
30.	Knows first aid and correct procedures for shock treatment.	_____	_____	_____	33529

CRITICAL INCIDENT ANALYSIS

Occupation: Electricity - Electronics

	JOB KNOWLEDGES	Is this knowledge-- Essential	Desirable	Unnecessary	Office Use Only
31.	Knows series and parallel circuits and combinations of both.	____	____	____	33530
32.	Knows how to bend and form conduit and the proper fittings.	____	____	____	33531
33.	Knows how to protect circuits and equipment, and the devices used.	____	____	____	33532
34.	Knows the color codes special to the trade such as communication cables, and "Bell" wires.	____	____	____	33533
35.	Knows radio, television, and radio control.	____	____	____	33534
36.	Knows how to form chassis and the use of brakes, shears, benders, chassis punches, nubblers, etc.	____	____	____	33535
37.	Has complete knowledge of frequency, its origin, and control.	____	____	____	33536
38.	The precautions necessary when dealing with radio-activity.	____	____	____	33537
39.	Knows how to use such aids as calculator.	____	____	____	33538
40.	Knows how to repair printed circuits and the correct chemicals to use.	____	____	____	33539
41.	Knows Pyro-Tronics and its electronic use.	____	____	____	33540
42.	Knows math involved in billing and business procedures in the service field.	____	____	____	33541

BEHAVIORS

DEFINITION: The manner in which someone behaves; social conduct, attitudes, personality.

DIRECTION: A list of behaviors needed for the occupation begins on the next page. Check whether you feel each behavior is essential, desirable, or not necessary in your particular job.

Additional behaviors may be listed at the end of this section.

CRITICAL INCIDENT ANALYSIS

Occupation: _____

	BEHAVIORS	Is this behavior-- Essential	Desirable	Unnecessary	Office Use Only
	Exhibits neatness--				
1.	In handling tools and equipment.	_____	_____	_____	0001
2.	In keeping supplies in order.	_____	_____	_____	0002
3.	In the work area.	_____	_____	_____	0003
4.	In grooming and dress appropriate for the job.	_____	_____	_____	0004
	Shows dependability--				
5.	In completing work on time.	_____	_____	_____	0005
6.	In getting to work on time.	_____	_____	_____	0006
7.	In coming back from "breaks" on time.	_____	_____	_____	0007
8.	In reporting to the supervisor when there is a need to leave the work area.	_____	_____	_____	0008
	Shows responsibility--				
9.	In completing jobs assigned.	_____	_____	_____	0009
10.	In being sure any reports or records are completed.	_____	_____	_____	0010
11.	In being sure reports are forwarded to the appropriate person.	_____	_____	_____	0011
12.	In being able to work with minimal supervision.	_____	_____	_____	0012
13.	In being able to interpret and follow written and verbal directions.	_____	_____	_____	0013
14.	In anticipating need for and care of tools, equipment, and supplies.	_____	_____	_____	0014
15.	In demonstrating a concern for safety practices.	_____	_____	_____	0015
	Behaves courteously toward--				
16.	Fellow employees.	_____	_____	_____	0016
17.	Superiors.	_____	_____	_____	0017
18.	Visitors to firm.	_____	_____	_____	0018
19.	Customers and clients.	_____	_____	_____	0019

CRITICAL INCIDENT ANALYSIS

Occupation: _____

	BEHAVIORS	Is this behavior-- Essential	Desirable	Unnecessary	Office Use Only
20.	Gets along with people.	_____	_____	_____	0020
	Is willing to work--				
21.	With details.	_____	_____	_____	0021
22.	With routine types of work.	_____	_____	_____	0022
23.	With tools, machines, and equipment.	_____	_____	_____	0023
24.	With continuous job and work area change.	_____	_____	_____	0024
25.	Under time pressure.	_____	_____	_____	0025
26.	Under performance standard pressures.	_____	_____	_____	0026
27.	With things rather than people.	_____	_____	_____	0027
28.	Alone for long periods of time.	_____	_____	_____	0028
29.	Long hours if necessary to complete job.	_____	_____	_____	0029
	Works with customers--				
30.	In explaining the company's policy.	_____	_____	_____	0030
31.	In explaining defects when appropriate and probable cause.	_____	_____	_____	0031
32.	In explaining the operation of equipment when appropriate.	_____	_____	_____	0032
33.	In explaining solution to a problem.	_____	_____	_____	0033
34.	Demonstrates safe driving habits and respect for company cars and trucks.	_____	_____	_____	0034
35.	Helps determine specifications for wiring (location of switches-outlets-fuse panels or breakers).	_____	_____	_____	0035
	Is discrete--				
36.	In furnishing information to callers and visitors to the office.	_____	_____	_____	0036
37.	In using telephone for personal purposes.	_____	_____	_____	0037

CRITICAL INCIDENT ANALYSIS

Occupation: _____

	BEHAVIORS	Is this behavior-- Essential	Desirable	Unnecessary	Office Use Only
38.	In releasing information concerning financial records.	_____	_____	_____	0038
39.	In handling information from files.	_____	_____	_____	0039
40.	Is constantly trying to improve his scope of knowledge and ability.	_____	_____	_____	0040
41.	Is alert to needs of chief electrician and supplies them.	_____	_____	_____	0041
42.	Is able to accept constructive criticism and follow verbal orders given under emergency situations.	_____	_____	_____	0042
43.	Is able to make decisions within the framework of his training and act upon them.	_____	_____	_____	0043
44.	Displays leadership ability.	_____	_____	_____	0044
45.	Displays accuracy in his work.	_____	_____	_____	0045
46.	Displays efficient work habits.	_____	_____	_____	0046
47.	Displays confidence in his work.	_____	_____	_____	0047
	Exhibits neatness--				
48.	In handling work orders and copy.	_____	_____	_____	0048
49.	In all phases of production and job handling.	_____	_____	_____	0049
	Displays dependability--				
50.	In producing the best quality work.	_____	_____	_____	0050
	Is willing to work--				
51.	In performing preventive maintenance.	_____	_____	_____	0051
52.	In using materials and supplies conservatively.	_____	_____	_____	0052
53.	Demonstrates a concern for continuing education and personal upgrading.	_____	_____	_____	0053

CRITICAL INCIDENT ANALYSIS

Occupation: _____

	BEHAVIORS	Is this behavior-- Essential	Desirable	Unnecessary	Office Use Only
54.	Practices safety in use of high pressure air and gas equipment.	____	____	____	0054
55.	Capable of conducting tests and experiments on supplies and equipment.	____	____	____	0055
56.	Conscious of tools and equipment capabilities and limitations.	____	____	____	0056
57.	Demonstrates the capacity for scientifically solving problems.	____	____	____	0057
58.	Displays loyalty toward his employer and/or the firm.	____	____	____	0058
59.	Displays moral character acceptable to other workers, tenants, and customers.	____	____	____	0059
60.	Demonstrates appropriate conduct for making service calls.	____	____	____	0060
	Demonstrates concern for safety and health hazards in terms of--				
61.	Safety and health of workers.	____	____	____	0061
62.	Safety and health of tenants.	____	____	____	0062
63.	Safety to buildings and equipment.	____	____	____	0063
64.	Safety to the job.	____	____	____	0064
65.	Safety and health of customers.	____	____	____	0066
66.	Displays desire to maintain acceptable personal physical condition.	____	____	____	0065
67.	Shows responsibility in planning and organizing work load.	____	____	____	0067
68.	Demonstrates concern for dress appropriate to the job, with emphasis on safety (gloves, loose clothing, etc.).	____	____	____	0068
69.	Demonstrates concern for quality of work as a craftsman with accent on neatness and avoiding so call temporary repairs.	____	____	____	0069

BASIC SKILLS

DEFINITION: The ability to use mathematics, reading, writing communication and any other skills considered important in order to begin training toward an occupational goal.

DIRECTION: Place a check mark in one of the right-hand columns for each basic skill.

Additional skills you consider basic skills can be listed at the end of this section.

CRITICAL INCIDENT ANALYSIS

Occupation: _____

BASIC SKILLS	Is this basic skill-- Essential	Desirable	Unnecessary	Office Use Only
1. To be able to perform and apply simple mathematical functions: addition, subtraction, multiplication, division.	_____	_____	_____	0401
2. To have a basic understanding of algebra.	_____	_____	_____	0402
3. To be able to read at a level commensurate with tasks performed.	_____	_____	_____	0403
4. To be able to read and comprehend statistical and written data.	_____	_____	_____	0404
5. To be able to write words and numbers legibly.	_____	_____	_____	0405
6. To have a good command of the English language.	_____	_____	_____	0406
7. To be able to perceive color properly (color blind test).	_____	_____	_____	0407
8. Has dexterity adequate for the job.	_____	_____	_____	0408
9. To be able to speak pleasantly and courteously in person and on communication devices.	_____	_____	_____	0409
10. To be familiar with rules of grammar, spelling, and punctuation.	_____	_____	_____	0410
11. To be able to use alphabetic and numeric systems.	_____	_____	_____	0419
12. To be able to practice good safety measures and use first aid when necessary.	_____	_____	_____	0421
13. To be able to use necessary hand power tools at a safe and productive level.	_____	_____	_____	0422
14. To be able to read and interpret drawings and specifications.	_____	_____	_____	0423
15. To be able to make drawings.	_____	_____	_____	0424
16. To be able to maintain information and cost records for reporting purposes.	_____	_____	_____	0425
17. To be able to manipulate and assemble parts.	_____	_____	_____	0426
18. Has a mechanical aptitude that will allow understanding of basic principles.	_____	_____	_____	0427

CRITICAL INCIDENT ANALYSIS

Occupation: _____

BASIC SKILLS	Is this basic skill-- Essential	Desirable	Unnecessary	Office Use Only
19. Must be able to stand for long periods of time.	_____	_____	_____	0428
20. Has no physical impairments, such as serious back problems.	_____	_____	_____	0429
21. Must be able to run basic machine tools.	_____	_____	_____	0430
22. To be able to use tools of electrical trade.	_____	_____	_____	0432
23. To understand the use of all common electrical meters and testing devices.	_____	_____	_____	0433
24. To be familiar with soldering.	_____	_____	_____	0434
25. To understand electrical circuits.	_____	_____	_____	0435
26. Knows Ohms Law and electrical theory.	_____	_____	_____	0436
27. Knows AC and DC current.	_____	_____	_____	0437
28. To understand series and parallel circuits.	_____	_____	_____	0438
29. To know relays, switches, transformers, capacitors, resistors, generators, batteries, and magnetism.	_____	_____	_____	0439
30. To understand the use of decimals in measuring tolerances and clearances.	_____	_____	_____	0440
31. To recognize degrees of rotation (example: 10 degrees).	_____	_____	_____	0441
32. To understand and properly complete manufacturers' warranty claim forms.	_____	_____	_____	0442
33. Possesses good or corrected hearing.	_____	_____	_____	0444
34. To have an understanding of basic physical sciences.	_____	_____	_____	0445
35. To read and interpret common measurement devices, using feet, inches, pounds, ounces, unit rotation.	_____	_____	_____	0447
36. To interpolate and extrapolate measurement values.	_____	_____	_____	0448
37. To estimate and approximate measurements.	_____	_____	_____	0449
38. To convert measurements from one unit to another.	_____	_____	_____	0450
39. To measure using conventional unit notation: linear (length-distance), weight (ounces-pounds), size (area), and volume (cubic).	_____	_____	_____	0451

CRITICAL INCIDENT ANALYSIS

Occupation: _____

	BASIC SKILLS	Is this basic skill-- Essential	Desirable	Unnecessary	Office Use Only
40.	To read, interpret, and use size-scale relationship.	_____	_____	_____	0452
41.	To record measurements using appropriate notation.	_____	_____	_____	0453
42.	To read and interpret basic graph relationships.	_____	_____	_____	0454
43.	To measure, compute, and estimate perimeter, areas, and volumes.	_____	_____	_____	0455
44.	To read and interpret coefficient measurements.	_____	_____	_____	0456
45.	To read and interpret building trades measurements, specifications, indicated in table form.	_____	_____	_____	0457
46.	To read and interpret carpenter's rules and measurement tapes.	_____	_____	_____	0459
47.	To read and interpret building codes.	_____	_____	_____	0460
48.	To read and interpret building permits, and licenses, the forming square, mechanical drawing, relationships, and orthographic projection views.	_____	_____	_____	0461
49.	To demonstrate eye-hand coordination.	_____	_____	_____	0463
50.	To work or move readily about an elevated frame or structure, with no fear of height.	_____	_____	_____	0464
51.	Maintains balance readily, and is physically agile.	_____	_____	_____	0465
52.	Knows building trades vocabulary.	_____	_____	_____	0467
53.	To be able to use necessary hand tools at a safe and productive level.	_____	_____	_____	0468
54.	To be able to read at a level to understand and follow directions in equipment manuals and code books.	_____	_____	_____	0469
55.	To be able to read at a level to interpret labels, directions on labels, and specifications in equipment manuals.	_____	_____	_____	0470
56.	To understand electrical circuits used on control systems.	_____	_____	_____	0471

CRITICAL INCIDENT ANALYSIS

Occupation: _____

BASIC SKILLS	Is this basic skill-- Essential	Desirable	Unnecessary	Office Use Only
57. To measure accurately to 0.01 inches.	_____	_____	_____	0472
58. To understand basic operation of physical plant.	_____	_____	_____	0473
59. To be able to record drawings.	_____	_____	_____	0474
60. To be able to lift heavy objects.	_____	_____	_____	0476