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JOB ANALYSIS AS A DATA BASE FOR SELECTION AND TRAINING OF CUSTODIAL/MAINTENANCE EMPLOYEES

By

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ABSTRACT

JOB ANALYSIS AS A DATA BASE FOR SELECTION AND TRAINING OF CUSTODIAL/MAINTENANCE EMPLOYEES

By

Glenn R. Doran

The purpose of this study was to illustrate a basis for making decisions in selecting employees and in diagnosing training needs of employees. The study dealt specifically with the position of school custodian, but the model developed was intended to generalize to any of the various support personnel positions that may exist in a school district.

The objective of the study was to present a model using job-analysis data to provide a basis for identifying training needs in the existing work force. Specifically, the following objectives were focused on in the study:

1. To secure rankings from custodial supervisors of various custodial tasks on the basis of (a) task frequency, (b) task difficulty, and (c) task-error consequence.

2. To develop a hierarchy of training needs based on the rankings provided by custodial supervisors.

A questionnaire was developed and mailed to custodial supervisors in 95 Michigan school districts having enrollments of 2,500 to 4,000 students. The supervisors were asked to complete the four-part

questionnaire providing data on facilities and staffing characteristics, selection and training information, evaluation of 60 job skills, and training-needs assessment for the same 60 job skills.

The data regarding facilities and staffing as well as selection and training information were compiled and reported as background information for the study. Data from the evaluation of job skills and the training-needs assessment of job skills were compiled and processed to produce rank orderings on four job-skill criteria: (1) frequency, (2) difficulty, (3) error consequence, and (4) level of training need. These rank orderings were then used to construct matrices illustrating rank-order groupings of various job-skill categories.

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This study would not have been possible without the cooperation of the 55 custodial/maintenance supervisors who participated in the survey. Their cooperation is greatly appreciated.

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CHAPTER I

INTRODUCTION

Support personnel in a local school district have an important effect on the quality of the educational experience of children. In many school districts, the first and last school employee the child encounters is a bus driver. At school, the physical environment, cleanliness, temperature, and safety all depend on support personnel, not instructional personnel. The mental state of the child can be affected by the environment in which instruction occurs. The safety and physical comfort of the child are legitimate concerns of the school district, and it is imperative that competent personnel be employed in the support operations to insure the provision of an environment that is hospitable to the tasks of education.

Beyond providing an environment compatible with learning, the level of ability existing within support personnel can affect the availability of monies to finance the instructional effort. The area of utility expenditure provides an excellent example of this influence. Utilities are generally viewed as "fixed" costs. Regardless of other demands, the schools must be heated, hot water must be provided, and floors must be cleaned.

Although the costs of these services are "fixed" in that they are an integral part of the operation of the school physical

plant, these costs are also "variable" in that they can be increased or decreased through the actions of support personnel. The custodian who knows that heating-system filters must be periodically cleaned to maximize efficiency of the heating plant can have a significant effect on reducing the amount of heating fuel used to maintain a specified level of comfort. On the other hand, a custodian who is unaware that clogged filters greatly reduce heating-system efficiency will contribute to higher heating-fuel consumption.

In an address presented at the 111th Convention of the American Association of School Administrators, Brewin and Racich (1979) pointed out that a principal cause of wasted energy in the nation's schools is inadequate knowledge of operation and maintenance techniques on the part of building custodians and maintenance personnel. In addition to developing planned preventative maintenance programs and developing better systems of recording utility use, Brewin and Racich strongly recommended that more on-the-job training be provided for custodial personnel.

The effect that well-trained custodians may have on operational costs has been illustrated through the Annual Maintenance and Operations Cost Studies conducted by the American School and University publication. Its tenth annual study, published in March 1981, stated that the cost per pupil for plant maintenance and operation more than quadrupled during the period from 1970 to 1981, rising from $20.05 to $82 per student. During this period, the cost of heating utilities increased almost six-fold, whereas the cost of other utilities increased by a factor of 4.5. With these incredible increases in

utility costs, the role the building custodian may play in cost containment is proportionately increased.

The factor in the educational enterprise that can most accurately be described as "fixed" is financial resources. At least on an annual basis, the school district is confronted with the challenge of distributing a finite amount of money to the various facets of the school operation, which at the very minimum would be instruction, transportation, business operations, plant maintenance, plant operation, administration, and food service. Obviously, monies budgeted for any one of these operations become unavailable to the other operations.

The school district's primary purpose and reason for existence is to provide for the instruction of children. Thus it follows that school districts should make every attempt to assure a maximum flow of educational dollars to the instructional program. This can best be accomplished through the development of effective and efficient support operations. A key to attaining that objective is to staff the support operations with a well-trained, competent work force.

Statement of the Problem

The problem addressed by this study was the improvement of the selection and the diagnosis of training needs for support personnel. The objective of the study was to present a model using job-analysis data to provide a basis for identifying training needs in the existing work force. Specifically, the following objectives were the focus of the study:

1. To secure rankings of various custodial tasks on the basis of (a) task frequency, (b) task difficulty, and (c) task error consequence. These rankings were secured from custodial supervisors.

2. To develop a hierarchy of training needs based on the rankings provided by custodial supervisors.

Importance of the Study

Support operations such as custodial services, maintenance, transportation, and food services are a part of the total school operation. It is important, however, to remember that these operations compete with the primary operation, instruction, for available dollars. Three principal criteria for these support operations are that they provide an optimal environment for the instructional program, that they provide dependable service, and that they are conducted in an efficient manner so that they do not require a larger-than-necessary portion of the available financial resources. Increasing the quality of employees in the support operations, whether through improved selection techniques or through well-designed training programs, offers a viable method for improving the general effectiveness and efficiency of the operation.

School districts have three choices in improving the competency level of support-staff employees. First, selection methods can be developed to screen applicants so that those who are eventually employed possess the skills and knowledge to satisfy the job requirements. Second, districts can rely on training programs to increase the competency level of new and existing employees. Third, districts can

develop selection methods that increase the probability of hiring persons who have the necessary skills and can augment the selection process with a training program designed to increase employee competence.

This study focuses on the third option, a combination of improved selection methods and training programs as an effective and realistic approach to developing and maintaining a competent work force. This focus was selected in consideration of several realities that influence school-district staffing decisions. The labor pool from which schools draw does not contain a great number of persons trained for the jobs available in school districts. To devise a selection procedure that would filter out all applicants except those who are experienced in custodial functions would be tantamount to devising a system that in most cases would yield no qualified applicants.

The resources of most school districts do not permit the operation of a comprehensive custodial training program. Therefore, much of what is to be learned must be learned through trial and error or through a patchwork program of training often not aimed at the most serious training needs. The presence of organized training programs in school districts is not common. In May 1973, the Nation's Schools publication conducted a survey on the extent of organized training programs. The results of the survey indicated that approximately one-third of the districts provided some form of training for veteran employees. Only 14 percent of the districts offered training for newly hired employees.

Training for custodial employees and many other support personnel has been grossly neglected. Initial steps in developing worthwhile training programs for support personnel are the identification of important job skills and improvements in employee-selection procedures. This study presents a process for accomplishing these tasks through analysis of the job skills required of custodial employees.

Limitations of the Study

The nature of this study was such that the interest of the participant was essential. Rather than attempting to represent a random sample, the study was specifically limited to school districts in a specific size range. Collective judgments of practicing supervisors of custodial personnel were used to develop a profile of entry-level skills that may be expected of custodians and to present data that will assist in anticipating training needs and in planning training programs.

The panel-of-experts research technique appeared to be the most realistic research tool to employ in this study. A survey of the literature failed to uncover any data that correlated particular applicant skills with success in the custodial position. Such data can be developed only through a longitudinal study employing a thorough analysis of employee skills. The review of literature also failed to uncover any objective methods that have been employed to determine custodial training needs.

The data gathered in this study have been consolidated and are reported as a compilation of responses regarding a particular evaluative determination for each job skill. Results are presented in terms of relative rankings rather than absolute determinations. Being so stated, the results are deficient because they do not give the reader direction as to what actions should be undertaken and what methods are currently sufficient. Instead, the results indicate what should be done first to achieve the maximum positive consequence.

Definition of Terms

The following terms are defined in the context in which they are used in this dissertation.

Entry skill: A job skill that the potential employee is expected to possess before placement in the job situation.

Formal training: Training programs presented to employees; special training sessions presented to employees on a regularly scheduled basis.

Independent training: New employees learn the job through their own resources and initiative; the employee contacts experienced employees or supervisor when he/she has a problem.

Informal training: Employees learn through experience on the job; supervisory staff or experienced employees instruct new personnel as the job situations occur; in-service activities are conducted occasionally for all employees.

Job analysis: The division of a job position into its component tasks and/or duties.

Overview

Presented in Chapter I were an introduction to the study, a statement of the problem, the importance and limitations of the research, and definitions of terms used in the dissertation.

Chapter II is a review of literature in three areas: general studies of training programs provided for classified employees, writings concerned with the content of training programs for school operation and maintenance personnel, and studies related to training-needs assessment and the design of employee training programs.

Chapter III contains an explanation of the design of the study, the development of the questionnaire, and the data-analysis methods used in the study.

Results of the data analysis are discussed in Chapter IV.

Chapter V contains the summary and conclusions of the study, recommendations, and implications of the research.

CHAPTER II

REVIEW OF THE LITERATURE REGARDING TRAINING AND/OR SELECTION OF CLASSIFIED SCHOOL EMPLOYEES

The educational literature includes an abundance of studies and models relating to the pre-service and in-service education of instructional personnel. However, very little literature is available that specifically addresses the in-service training of classified employees. Galluzzo (1955) and Sorsobal (1970) reported that very little literature was available regarding the administration of classified personnel. Unfortunately, since 1970 there has not been a significant increase in the availability of literature regarding the in-service training of classified employees. Sorsabal found that although the literature is relatively nonexistent on in-service training for classified employees in the public schools, there appears to be an almost inexhaustible supply of references relating to training programs that operate in business and industry.

The literature reviewed in the present research effort fell into three primary categories:

1. general studies of training programs provided for classified employees,

2. literature and studies specifically concerned with the content of training programs for school operation and maintenance personnel, and

3. literature and studies related to training needs assessment and the design of employee training programs.

General Studies of Training Programs Provided for Classified Employees

The Sorsabal Study

Sorsabal (1970) examined the in-service training programs for classified employees in 150 selected educational institutions and determined the critical training requirements. Data for the study were obtained by a preliminary questionnaire on training scope and content and by a critical-incident questionnaire.

For the purpose of his study, Sorsabal defined in-service training as "the process which provides for the continuous, systematic development among all levels of employees of the knowledge, skills and attitudes which contribute to individual welfare and efficiency of the organization." He further outlined the organizational climate necessary for effective in-service training and offered pragmatic justification of in-service training programs.

Citing Planty, McCord, and Efferson (1948), Sorsabal summarized those concepts that demonstrate a strong commitment to training and thus assist organizations in developing successful programs as being the following:

1. The program rests on the assumption that planned, organized teaching is more profitable for management and results in greater satisfaction and advancement for employees than does the alternative of turning the worker loose to learn through his own unguided inexperience.

2. Training is needed on all levels.

3. Training must be continuous.

4. To be effective under modern conditions, training must deal with employee knowledge and attitudes as fully and effectively as it does with skills.

5. To be effective, training must be prepared originally for a particular group and must be constantly adapted to their changing needs.

6. Training must be directed by persons especially prepared for this work.

7. Training requires full and persistent support from management if it is to succeed.

Sorsabal defined three types of training programs based on the function to be fulfilled. Induction programs are those designed to acquaint newly hired employees with those with whom they will be working, the purposes of their operation, and its relationship to the total organization. Skill-development training is those in-service training programs, both on and off premise, that are designed to familiarize the employee with his specific job assignment. Sorsabal noted that most skill-development training in public school organizations consists of on-the-job training programs. Finally, he described staff-development programs as those designed, developed, and implemented to stress both the employee's improvement in his/her present assignment and his/her preparation for future responsibilities.

In his study of the in-service training programs of 25 large California school systems, 75 large school systems throughout the

remaining 49 states, and 50 state departments of education, Sorsabal addressed three questions that are specifically relevant to this study:

1. To what extent are systematic and planned in-service training programs provided for classified school employees?

2. What types of activities constitute planned, systematic training programs?

3. What are the critical requirements of effective in-service training programs?

Sorsabal listed 21 findings in his study. The findings that particularly address the questions posed above are as follows:

1. In-service training activities were extensively provided for classified employees by the respondent educational organizations selected for the study.

2. The training efforts reported by the respondents were varied in scope and content.

3. The greatest training effort was expended on skill-improvement activities for food service, clerical, and operations personnel.

4. Participation in training activities was usually voluntary.

5. Skill-improvement training was usually conducted in the work location.

6. Evaluation of training efforts was as frequent as it was infrequent. Training was most commonly evaluated through on-the-job performance.

7. Participants expressed a positive attitude toward in-service training.

8. The applicability of training activities was the most critical concern of the respondents.

9. The training needs of the employees varied with their age and tenure. The younger, less experienced and the older, more experienced employees were concerned more with skill-improvement than with job-advancement training.

10. The areas of critical concern identified by respondents were skill-improvement activities, instructional techniques, the instructor, interpersonal relations, environment, and scheduling of job-advancement activities.

Sorsabal concluded that there was no best way to organize the training of classified personnel. However, he suggested that a decentralized training program has the most potential for satisfying the critical concerns identified by employees.

The Sorsabal study provided the major resource in the publication of a research bulletin for the Association of School Business Officials. The bulletin, entitled "A Handbook for In-Service Training of Classified Employees," was published in 1970 and has been made available to most school business officials in the United States and Canada.

Studies and Literature Pertaining to the Content of Custodial Training Programs

The Barbour Study

Barbour (1954) studied the methods and criteria for selection of school custodians and the methods and curricula used in the instruction of custodians. He interviewed 100 Michigan school administrators about the following factors involved in the selection and training of custodial personnel:

1. The information solicited from candidates for custodial work.
2. The lists of characteristics upon which selection of custodians was based.
3. Employment practices used in employing custodians.
4. Methods for instruction of custodians.
5. Items included in instructional programs for custodians.

Barbour found that school administrators sought common characteristics in the persons they recommended for employment as school custodians. More than 75 percent of the respondents indicated a preference for candidates judged to be temperate, industrious, trustworthy, clean in personal habits, capable of learning building-maintenance procedures, and emotionally stable. In his recommendations, Barbour cautioned school administrators to avoid hiring persons previously convicted as child molesters, sexual offenders, and sexual deviates.

Only 5 of the 100 districts included in the Barbour study were found to use a written test on custodial work as a criterion

for the selection of custodians. However, 90 percent of the respondents indicated a desire for assistance in obtaining a test for such purposes.

Barbour concluded that instruction for custodial personnel had increased in the 30-year period preceding his study. He found that, in 1924, Iowa was the only state offering instruction in custodial practices. By 1954, 24 states were providing custodial instruction through their state vocational departments. Michigan was not among those states providing such instruction.

Less than one-half of the schools Barbour studied provided general instruction for custodial staff. When such instruction was provided, it included the use of consultants, printed materials, governmental employees such as boiler inspectors, sanitarians or fire inspectors, or class instruction provided by other school personnel.

Barbour found that more than 84 percent of the custodians included in the study were taught the correct and economical use of cleaning supplies and equipment. Fifty-four percent of the districts provided instruction in proper floor maintenance and care. Very few of the districts provided training in grounds maintenance. The respondents tended to rely on the previous experience of custodial staff as a source of knowledge for this function.

Barbour concluded that Michigan school officials would benefit from the development of a written testing instrument to be administered as part of the selection process for school custodians. He suggested that time-and-motion studies of custodial work should be conducted to establish basic work standards.

The investigator cited five specific areas in which custodians' instruction could be improved: the objectives of education, boiler room operations, combustion efficiency, security checks, and emergency operations such as civil defense actions or severe weather situations.

The findings of Barbour's study related to criteria for selection of custodians, information solicited from custodial applicants, and methods of instruction of school custodians are presented in Tables 2.1, 2.2, and 2.3, respectively.

The Wargo Study

Wargo (1969) conducted a survey of custodial training programs in Indiana to determine the number of persons employed in custodial positions, to assess school administrators' attitudes toward training custodians, to identify those districts that had developed custodial handbooks, and to ascertain administrators' opinions regarding custodial services. After surveying 235 school districts, he determined that 56 of those districts had custodial training programs.

Wargo found that a majority of schools used the apprenticeship method of training. Demonstrations by supply-company salesmen were commonly used to increase the job knowledge and skills of experienced custodians. Of the 56 districts that had custodial training programs, none offered training through college classes or correspondence courses. The primary areas of instruction were in housekeeping, employment practices, and benefits. Training in educational purposes,

Table 2.1.--Selected school systems in Michigan using certain characteristics as criteria in selecting custodians.

Characteristic	Percent of Districts Citing as Criterion
Must be temperate, industrious, and trustworthy	99
Must have clean personal habits	97
Must be educable in building-maintenance methods	97
Must be emotionally stable	86
Must be 21 years of age or older	78
Must be interested in youths and their problems	75
Must be a citizen of the United States of America	65
Must have satisfactory home relationships	62
Must pass a physical examination by a competent physician	59
Must never have been convicted of a felony	53
Must indicate by conditions of own living premises an interest in well-kept grounds	46
Must be able to pass a written examination on custodial work	5

Source: Julius E. Barbour, "The Selection and Instruction of Public School Systems" (Ph.D. dissertation, Michigan State University, 1954).

Table 2.2.--Items of information concerning applicants for custodial work obtained by selected Michigan school systems.

Items of Information	Percent of Schools Seeking Information
Name	100
Address	100
Phone number	99
Years of residence in the community	93
Marital status	79
Names of two or more references	77
Willingness to take training for work	67
Length of time employed at each of last three jobs	63
Educational grade completed	63
Work operation performed at last three jobs	63
Reasons for wanting custodial work	62
List of last three places of employment	60
Reasons for leaving last three places of employment	56
Birthplace	55
Hours of instruction in custodial work	55
Home owner or renter	47
Nationality	39
Religious preference	20
Licenses possessed	20

Source: Julius E. Barbour, "The Selection and Instruction of Public School Systems" (Ph.D. dissertation, Michigan State University, 1954).

Table 2.3.--Number of selected schools in Michigan that used certain methods of instructing custodians.

Method of Instruction	Number of Schools Using Method
Individual conferences arranged	99
Small-group conferences held	92
Custodians enrolled in statewide institutes	82
Demonstrations given by sales personnel of supply houses	79
Meetings of all custodians in school system took place	66
All beginners apprenticed to work under direction of experienced custodian	64
Instruction given by nurses, fire inspectors, sanitarians, etc.	52
Magazine articles circulated among custodians	48
Consultant employed to work with custodians	45
Information mimeographed and distributed	42
Once-a-week classes conducted for custodians	13
A manual on custodial work compiled by a committee of custodians	5
Custodians studied to pass a licensing examination	5
Custodians enrolled in correspondence courses	2

Source: Julius E. Barbour, "The Selection and Instruction of Public School Systems" (Ph.D. dissertation, Michigan State University, 1954).

aims, and objectives was neglected, as were custodial evaluation methods. Few school districts had custodial handbooks.

Wargo asked respondents to indicate the areas of instruction included in their school districts' custodial training programs. The areas of instruction and the percentage of districts providing the specified instruction are shown in Table 2.4.

Wargo found that persons in the field of school-plant management generally agreed that the position of school custodian is important to the overall welfare of the school district. At the same time, he found that 78 percent of Indiana school districts did not have custodial training programs. However, almost all of the school administrators in his study (96.8 percent) felt that custodians should be trained.

Most school districts in the study employed a variety of training techniques, but the most frequently used method was to duplicate and distribute custodial literature to operational personnel. Wargo found that districts employing 30 or more custodians tended to offer more extensive training programs. In 80 percent of the districts in which training was provided, the authorities said they were satisfied with the custodial service.

The Worrell Study

In 1973, Worrell undertook a project to identify exemplary standards and practices of several school districts in terms of school custodial services. He examined various formulas for determining custodial workloads, reviewed various job descriptions for custodial

Table 2.4.--Areas of instruction included in the custodial training programs of the 56 Indiana school corporations.

Area of Instruction	Percent of Districts Including Area in Training Program
The attitudes and ideals of the school custodian	82
The attire and personal grooming of school custodian	82
The work habits and initiative of school custodian	95
The organization chart, lines of authority, and channels of communication	78
The aims, objectives, and purposes of education	38
The custodian's relationship to principal and supervisor	93
The custodian's relationship to teachers and students	93
The custodian's relationship to members of the community	57
The nature of the cleaning and sanitation program	84
The nature of custodial maintenance and repair service	84
The physical-plant safety services and regulations	79
The types of sewage-disposal services	34
The custodian's responsibility to the lunchroom area	86
The procedures in care of yard and playground	86
The nature and kinds of extracurricular and community activities	61
Methods of cleaning and maintaining the floors	98

Table 2.4.--Continued.

Area of Instruction	Percent of Districts Including Area in Training Program
Methods of cleaning and servicing the sanitary facilities	96
Methods of cleaning the walls, ceilings, and trim	89
Methods of window cleaning	91
The care of erasers and chalkboards	80
The care and maintenance of school furniture	88
The care and maintenance of windowshades	71
The care and cleaning of lighting facilities	84
Methods of pest control in the school plant	64
The use of tools and supplies for repairs and replacement	73
The use of cleaning, sanitation, and maintenance supplies	91
The importance of school-plant economics	61
The methods used in determining work loads and man-hour requirements	55
The importance of job analysis	57
The scheduling procedure used in custodial operations and services	57
Methods of evaluating custodial operations and services	43
The sick leave, absence, holiday, and vacation policies	93

Source: John G. Wargo, "An Analysis of the Custodial Training Programs of Indiana School Corporations" (Ph.D. dissertation, Indiana University, 1969).

staff, and delineated several systems used by school districts to present a schedule of daily responsibilities for the custodial position. He also sought information on recommended techniques, materials, equipment, and personnel training for effective and efficient school custodial services.

Of particular concern in the Worrell study were the various descriptions for custodial positions. The collection of position descriptions provides a means of assembling expert consensus on the various duties entailed in plant operations.

Table 2.5 summarizes job qualifications recommended by districts included in Worrell's study. Table 2.6 presents the statements of custodial duties from those school districts.

Worrell stated that training school custodial employees is essential to the efficient operation of the school plant. He found that it is usually necessary to employ custodial personnel who have had no previous experience in the cleaning industry. Successful results of custodial in-service training efforts have shown that the relatively small cost of the training program is soon recaptured through increased employee effectiveness and efficiency.

Literature and Materials Related to Training Needs Assessment and the Design of Employee Training Programs

Job Analysis as a Data Base for Identifying Training Needs

A basic objective of a training program is to increase the competency of employees in performing the tasks that are required by a certain job. To be effective, a training program's activities must

Table 2.5.--Qualifications for school custodial employees as specified in school districts identified as having exemplary standards and practices.

Organization: Oregon School Employees Association

Custodian 1 and 2

Working knowledge of cleaning methods, materials, and equipment.

Ability to make repairs and adjustments to structures and equipment.

Ability to learn to properly tend furnaces and low-pressure boilers in small schools.

Ability to follow oral and written instructions.

Ability to exercise care in the use of cleaning materials for different types of building surfaces.

Ability to make out reports that may be required by the school administration.

Ability to take charge in receiving and caring for school supplies when principals are not on duty.

Physical strength to withstand the strain in performing the tasks that may be required of a custodial worker.

Personal cleanliness and freedom from communicable disease.

High moral standards and character necessary for association with children.

Minimum experience and training: Good personnel relations. Preferably six months of experience in work relating to the care and maintenance of school buildings and grounds.

Organization: Los Angeles Unified School District, California

Knowledge of:

Simple cleaning materials such as soap, detergents, and solvents.

Methods of cleaning floors, lavatories, and other areas of school buildings.

Sterilization and sanitation methods used in custodial work.

Table 2.5.--Continued.

Ability to:

Make minor repairs to materials, fixtures, and equipment.

Read water, gas, and electric meters.

Use floor polishing and scrubbing machines and other types of power machines.

Work harmoniously with school children, administrators, P.T.A. groups, teachers, and others.

Lift and move heavy supplies and equipment.

Education:

Successful completion of the 60-hour Custodial Engineering I course in an accredited institution is desirable and may be required during the initial probationary period as part of assigned duties.

Experience:

Six months of recent janitorial or custodial experience is desirable.

Special:

A valid California driver's license may be required by the duties of some positions.

Organization: Springfield Public Schools, Oregon

Considerable knowledge of modern building service operations, techniques, equipment, materials, and supplies; ability to plan and assign work to a few subordinate custodial workers and ability to supervise their performance of work assigned; supply needs in advance; ability to perform minor maintenance and repair work; ability to work harmoniously with fellow employees and possess high moral standards.

Organization: Hood River Public Schools, Oregon

He should be of good moral character and able to take instructions. He should be reliable and responsible. In addition, he should dress presentably.

Table 2.5.--Continued.

He should have the ability to work with other school personnel and be able to make the learning environment a contributing factor to learning.

He should have the ability to make oral reports and follow written and oral directions.

A Custodian I must be in good health and possess the physical ability to do work associated with the position.

A Custodian II should be of good moral character, able to direct and work with others as well as carry out the instructions of supervisory personnel. This includes making work schedules.

He should have a thorough knowledge of the methods, materials, and equipment used in custodial work; he should be able to make written and oral reports.

It is desirable that he also have several years' experience as a custodian preferably within the district, and have demonstrated reliability and responsibility.

Organization: Boise Public Schools, Idaho

Any combination of education and experience equivalent to completion of the eighth grade and two years of experience in the cleaning of buildings.

Knowledge of practices, tools, equipment, and materials used in custodial work, of safety practices as applied to custodial work, of building hardware, fixtures, and equipment, and of the principles and practices of supervision.

Ability to operate tools and equipment used in custodial work.

Ability to perform minor maintenance work.

Ability to perform manual labor.

Ability to follow and give oral and written instructions.

Table 2.5.--Continued.

Organization: Salem Public Schools, Oregon

A. Head Custodian I

Knowledge of:

Modern cleaning methods and the use and care of cleaning materials and equipment.

Requirements for maintaining school buildings and grounds in a safe, clean, and orderly condition.

Methods, materials, equipment, and tools used in routine building and grounds maintenance work.

Operation of heating plant and equipment.

Ability to:

Lay out work, and to estimate time, tools, and materials needed.

Perform minor repairs to electrical and plumbing fixtures.

Operate power mowers, tractors, and trucks.

Perform manual labor.

Follow oral and written instructions.

Maintain simple records.

Supervise the work of others and maintain cooperative relationships with those contacted in the course of work.

Experience:

Two years of paid experience in building maintenance or public-works construction.

Education:

Equivalent to completion of the twelfth grade

B. Head Custodian II

Knowledge of:

Tools, materials and methods used in unskilled and semi-skilled buildings and grounds maintenance work.

Custodial methods for cleaning and preserving of floors, walls, and fixtures.

Table 2.5.--Continued.

Cleaning materials, disinfectants, and equipment used in custodial work.

Methods, supplies, and tools used in watering and caring for lawns, shrubs, and trees.

Ability to:

Use tools utilized in custodial and grounds maintenance work.

Use hand tools in the performance of semi-skilled building maintenance tasks.

Supervise custodial, groundskeeping, and maintenance personnel assigned to a school, to plan and organize their work, and to see that the work is done effectively.

Prepare records and reports.

Experience:

Three years of paid experience in the cleaning and maintenance of a school plant or other large buildings and grounds areas.

Education:

Equivalent to completion of the twelfth grade.

C. Head Custodian III

Knowledge of:

Tools, materials, and methods used in unskilled and semi-skilled buildings and grounds maintenance work.

Custodial methods for the cleaning and preserving of floors, walls, and fixtures.

Cleaning materials, disinfectants, and equipment used in custodial work.

Methods, supplies, and tools used in watering and caring for lawns, shrubs, and trees.

Ability to:

Use tools utilized in custodial and grounds maintenance work.

Use hand tools in the performance of semi-skilled building maintenance tasks.

Table 2.5.--Continued.

Supervise custodial, groundskeeping, and maintenance personnel assigned to a school, to plan and organize their work, and to see that the work is done effectively.

Prepare records and reports.

Experience:

Four years of paid experience in the cleaning and maintenance of school plant or other large buildings and grounds areas.

Education:

Equivalent to completion of the twelfth grade.

D. School Custodian I

Knowledge of:

Modern cleaning methods and the use and care of cleaning materials and equipment.

Ability to:

Use cleaning materials and equipment with skill and efficiency.

Perform heavy physical labor.

Understand and carry out oral and written instructions.

Maintain cooperative relationships with fellow employees and the general public.

Obtain required health certificate.

Experience:

Some experience in janitorial work.

Education:

Equivalent to completion of the eighth grade.

Source: William K. Worrell, School Custodial Services: Exemplary Standards and Practices, A Commissioned Study (Woodburn: Woodburn Oregon School District, 1973).

Table 2.6.--Summary of custodial duties as specified in school districts identified as having exemplary standards and practices.

Organization: Oregon School Employees Association

Examples of work:

(Any one position may not include all of the duties listed, nor do the listed duties include all tasks that may be found in positions of this class.)

Wash windows, adjust window shades.

Dust and clean classrooms and office furniture.

Sweep, mop, scrub, seal, and wax floors.

Wash toilet-room fixtures and replenish supplies.

Fuse light circuits when needed.

Organization: Los Angeles Unified School District, California

Dusts, sweeps, cleans, scrubs, strips, seals, waxes, polishes, and mops floors in classrooms, dining halls, toilet rooms, offices, and similar facilities; operates floor polishing and scrubbing machines.

Removes spots from floors, walls, woodwork, furniture, and fixtures, and cleans chalkboards and erasers.

Cleans, dusts, high dusts, and polishes woodwork, glass, hall lockers, furniture, fixtures, and other installations.

Washes and scrubs walls, lavatory fixtures, inside glass, windows, painted surfaces, and drinking fountains.

Services soap dispensers, towel boxes, and similar facilities.

Sweeps and hoses blacktop, tennis courts, playgrounds, sidewalks, and parkways.

Replaces electrical fuses, incandescent bulbs, and fluorescent tubes.

Moves and adjusts chairs, desks, tables, furniture, and equipment.

Receives, checks, and delivers supplies.

Locks and unlocks doors, gates, windows, transoms, and storerooms.

Gives information in regard to locations of various school facilities.

Cleans, maintains, services, and makes minor adjustments to space heaters.

Table 2.6.--Continued.

Gathers and disposes of rubbish, paper, leaves, and debris and empties and washes refuse containers.

Waters grounds, lawns, and trees and may perform all necessary grounds maintenance during the summer in elementary-school gardens.

May perform a variety of cleaning and other manual tasks in a cafeteria.

May operate power sweepers and low-pressure heating plants.

May receive, account for, store, issue to students, pick up, prepare for returning, and safeguard towels in a gymnasium.

May raise, lower, and case flags.

May make minor repairs to building hardware, plumbing, woodwork, building equipment and furniture, and change lock combinations on lockers.

May check classroom, hot water, and fuel-oil temperatures.

Keeps records relative to equipment and furniture.

Performs a variety of unscheduled custodial duties as requested by the school office and teachers.

Attends in-service training as directed.

Performs related duties as assigned.

Organization: Springfield Public Schools, Oregon

Plans, assigns, and supervises work of a small custodial crew in the cleaning and related custodial operations of a large school building or a small group of buildings.

Trains new custodial-work employees and helpers in all facets of custodial and building-maintenance services.

Keeps an inventory of supplies and materials; estimates supply needs in advance; requisitions new supplies and materials.

Reports needed repairs and prepares work orders for various tradesmen to make necessary repairs.

Maintains necessary records with regard to personnel and equipment under his immediate supervision.

Performs minor and uncomplicated repair work in the maintenance of an office building and its equipment.

Prepares reports and confers with superiors on work progress and results.

Table 2.6.--Continued.

Orders fuel and keeps weekly inventory of fuel.

May be called for extra duties as required for holidays or emergencies.

Organization: Hood River Public Schools, Oregon

Sweep floors.

Make minor repairs, wash windows, dust, clean lavatories, sinks, and basins.

Replenish paper carriers in wash rooms.

Immediately clean up emergency messes that may be in such a place as to cause distraction or offense.

Empty wastebaskets, place waste containers in a position handy for the refuse collector to pick up.

Put up and take down the flag.

Oil motors.

Lock and unlock doors as necessary.

Turn on and off night lights.

Aid in the performance of maintenance tasks by more specialized personnel.

Maintain custodial equipment and otherwise assist in preserving the orderliness and cleanliness of buildings.

Drain, clean, and fire boilers, oil motors, doors, and door checks, order supplies from Head Custodian, make minor repairs and adjustments to school furniture. Do other related tasks as requested.

Organization: Boise Public Schools, Idaho

Assists in planning and scheduling the work of custodians; directs custodians in the cleaning of public buildings, the preparation of rooms for meetings, and the making of minor building repairs; makes routine inspections to review work in progress and upon completion; inspects buildings and other equipment to determine the need for cleaning; reports the need for building repairs; has overall responsibility for the safeguarding of the area assigned.

Table 2.6.--Continued.

Sweeps floors and vacuums rugs and carpets; dusts and polishes furniture and woodwork; empties and cleans waste receptacles, cleans restrooms, classrooms, shower and locker rooms, shops, cafetoriums, offices, gymnasiums, etc.; assists in moving and arranging furniture and equipment and setting up for special events or meetings; adjusts shades or blinds; may raise and lower flags and lock and unlock doors and gates; scrubs, mops, waxes, and polishes floors as assigned.

Organization: Salem Public Schools, Oregon

A. Head Custodian I

Confers with principal and Custodial Services Supervisor, regarding care and cleaning programs at the school plant; prepares work schedules and sees that work is done in accordance with instructions; operates heating plant; sees that rooms are set up for special events and needs; reports the need for repair work to proper authorities; performs minor repairs and adjustments to building fixtures and equipment; supervises and personally performs the cleaning of walls, furniture, woodwork, and other equipment; assists subordinates in doing their work properly, giving instructions and training new personnel; requisitions custodial supplies and equipment; inspects buildings for fire, sanitary, and safety hazards, and makes reports; directs visitors and safeguards school property; participates in the complete cleaning and routine maintenance of buildings and grounds during summer vacation; may perform routine groundskeeping duties.

B. Head Custodian II

Confers with principal and Custodial Services Supervisor regarding care and cleaning programs at the school plant; prepares work schedules and sees that work is done in accordance with instructions; inspects buildings and grounds to determine maintenance and custodial needs; confers with administrative and teaching officials regarding future custodial and groundskeeping activities; receives job requests for services and repairs, and takes lead in accomplishing same; lays out and assigns duties of custodial staff; inspects completed work; supervises and performs minor maintenance work on school buildings, using plumbing, carpentry, and electrical tools; issues orders for night custodial work through the night crew supervision; orders,

Table 2.6.--Continued.

receives, stores, issues, and accounts for necessary supplies and equipment; maintains records; and makes oral and written reports of work required and of work accomplished.

C. Head Custodian III

Confers with principal and the Custodial Services Supervisor regarding care and cleaning programs at the school plant; prepares work schedules and sees that work is done in accordance with instructions; inspects buildings and grounds to determine maintenance and custodial needs; confers with administrative and teaching officials regarding future custodial and groundskeeping activities; receives job requests for services and repairs, and takes lead in accomplishing same; lays out and assigns duties of custodial staff; inspects completed work; supervises and performs minor maintenance work on school buildings, using plumbing, carpentry, and electrical tools; orders, receives, stores, issues, and accounts for necessary supplies and equipment; maintains records; and makes oral and written reports of work required and of work accomplished.

D. School Custodian I

Working from a prepared work schedule, sweeps, scrubs, waxes, and polishes concrete, linoleum, tile and wood floors and vacuums rugs and carpets in school plant offices and rooms; cleans and dusts walls, furniture, woodwork, and other equipment; picks up paper and other refuse on grounds and sweeps walks and entrances; washes, scrubs, and disinfects rest rooms; cleans windows, door glass, and drinking fountains; cleans and polishes metal work such as floor panels and hand railings; empties and cleans waste containers; assists in moving or rearranging chairs, tables, desks, furniture, and other equipment; replaces light globes; maintains equipment used in the course of work; performs special custodial work upon request of faculty members; reports safety, sanitary, and fire hazards; assists in the complete cleaning and routine maintenance of buildings and grounds during summer vacation; may perform routine groundskeeping duties.

Source: William K. Worrell, School Custodial Services: Exemplary Standards and Practices, A Commissioned Study (Woodburn: Woodburn Oregon School District, 1973).

be based on knowledge of a particular job. The tasks must be understood in terms of the knowledge, skills, and abilities that are necessary for their performance.

Many training-program developers encounter difficulty because of a failure to understand fully the job for which training is being provided. The lack of a systematic process for analyzing job content results in misdirected training efforts that are not targeted on objective job data. Data must exist that define an expected or required performance and identify the areas in which performance does not meet acceptable levels.

Another source of frustration for designers of training programs is the failure to recognize that training is not the answer to every job-related problem (Cooke, 1969). Other performance problems are the result of lack of interest and motivation rather than lack of competency. When motivation problems are attacked by involving the workers in training programs, the gross losses in production are increased with a very small probability that post-training performance will show any improvement. It is entirely possible that production will be further depressed because of the alienation resulting from an unnecessary training program. In such a case, the solution may lie in a compensation program or in a change of work environment. The trick for managers is to differentiate between skill gaps and motivational deficiencies.

The training program must be properly linked to the total organization's objectives in order to be most effective. Since its basic purpose is to improve performance, the training program most

logically has its roots firmly anchored in a system that provides valid data about the nature of jobs and the characteristics of the target group, defined as persons who fill those jobs (Gestrelius, 1972). The training program attempts to minimize the dissonance between individual knowledge, skills, and abilities (KSA's) and the KSA's required for effective job performance.

Three basic steps in the development of a training program are (1) identification of training needs, (2) design of training content, and (3) evaluation of the training process and outcomes (DeCotiis, 1977). Job/task analysis provides the link for accomplishing each of these steps and serves as a general framework for adjusting to the changing organizational objectives. Training needs arise because people, jobs, and organizations change. New technology, the complexion of human resources, and economic influences place differing demands on the training mechanisms. These demands can be met only through a system that is sensitive to and descriptive of the changing nature of the organization's jobs. The essential requirement is that job and task analysis be a continuous process that recognizes the dynamic nature of an organization and its jobs.

The process of identifying training needs can be initiated by identifying all the tasks that are required by a job. The job description can be used as a general course for describing in behavioral terms the general activity areas relevant to a job. Task specification is the more specific enumeration of each task that must be performed. The particular KSA's required to perform the job then become apparent (Goldstein, 1974). The level of performance

compared with performance standards for each task serves as an indicator of training needs. Such a comparison exposes the performance discrepancies (Moore, 1978).

The KSA's associated with a job exist on a continuum from entry level to full-performance level (USCSC, 1976). During the selection process, potential employees are assessed in terms of their possession of entry-level KSA's. In addition to providing for good selection, well-constructed and valid KSA requirements protect the employee from legal action under EEO legislation. The smooth implementation of an AA program can have its base in the accurate assessment of the discrepancy between "qualifieds" and "qualifiables" (Heenan, 1980). The very fact that the discrepancy is defined at the entry stage allows for development of training programs to move the new employee from "qualifiable" to "qualified" status.

The task-analysis function may also be used to redesign jobs, thereby adjusting KSA requirements and making the job performable by a protected group. Fleishman (1979) examined the physical abilities required by jobs and found that many physically demanding jobs have been redesigned, thus allowing a larger proportion of women to be able to meet KSA expectations. The result has been a significant reduction of the adverse effect of job procedures. When jobs are redesigned, training is required to initiate both incumbents and new employees to the new procedures and task requirements.

As an employee's experience in a job increases, the movement on the KSA-requirement continuum progresses toward the full-performance level. The gap between the employee's locus on that continuum and the

full-performance KSA level expected by the supervisor aids in the planning of appropriate training (Odiorne, 1970). Figure 2.1 illustrates the relationship between entry-level KSA requirements, training, experience, and full-performance-level KSA requirements.

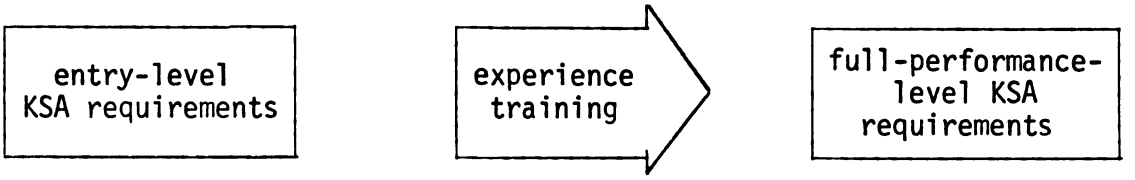

Figure 2.1.--KSA requirements.

It is evident that the experience component is primarily a function of time. The training component can be manipulated to increase the rate of development and thus reduce the time necessary to move to full-performance status. In addition to assessment of performance discrepancies, identification of training needs depends on such criteria as (1) task frequency, (2) consequence of error, (3) level of difficulty, and (4) time to perform (USCSC, 1976). The implications of competent performance on each task within a job role are not uniform. The consequence of error in performing a task may be so great that the employer cannot tolerate any error. Operation of school heating plants and use of acetylene torches are two examples of tasks having serious error consequence. The consequence dictates either full-performance KSA requirements at the entry level or participation in specific training and performance evaluation before the employee is allowed to perform the task independently.

The inefficient performance of a high-frequency task can result in significant productivity losses. In such cases, economic considerations make training a cost-effective method of attaining the organization's profitability objective. A very difficult task may require that almost all new employees be trained to meet job expectations. Each criterion must be applied to evaluating tasks, and priorities must be developed. The design and content of the training program will flow from this prioritization (Michaud, 1979).

Training programs may be designed to address one or more types of learning: cognitive, affective, or psychomotor (Cooke, 1969). Programs designed to impart knowledge or to give training in psychomotor skills are more easily evaluated than those dealing with affective tasks. Also, task analysis is more potent in defining knowledge and psychomotor KSA requirements than in defining affective requirements. Failure to meet performance standards that are the result of motivational problems is not easily resolved through training programs unless the training might be directed toward supervisory leadership skills (Cooke, 1969).

Provisions for evaluating a training program should be developed before the program is administered. Evaluation is the only means to identify and account for training to the organization (DeCotiis, 1977). Job analysis may be done with an emphasis on developing job criteria, which include standards of accuracy, speed, endurance, and flexibility. These characteristics are generally conducive to quantification, which in turn provides an objective base for evaluating the effect of training.

Much of an organization's success stems from the relatedness of job functions to organizational objectives. Job/task analysis appears to be a most systematic method for coordinating jobs with objectives. The job, once defined in terms of KSA requirements and performance standards, becomes its own prescription for training needs.

The specific delineation of tasks provides a base against which performance can be compared. The analysis of individual tasks provides opportunities to adjust various job segments, and it provides precise identification of areas in which performance improvement is required.

If a quality training program is to be developed, part of the process naturally involves the analysis of tasks to be performed. It appears that it would be advantageous to perform a task analysis before establishing a training program. If the order is reversed, the designer of the training program will be condemned to making false starts before it is discovered that job/task analysis is an integral part of and a prerequisite to development of an effective training program.

Needs-Assessment Literature

Broadwell (1975) listed three reasons for inadequate employee performance. The three reasons he listed are the need for training, the lack of knowledge of what needs to be done, and the lack of basic ability to perform the task. These three reasons, Broadwell maintained, are appropriately addressed through employee selection

procedures and training programs. He pointed out that in designing employee training programs, it is important to analyze particular tasks, but it is equally essential to analyze the total work situation. In this manner, individual tasks can be properly sequenced so that they flow together to promote optimal overall work productivity.

In analyzing the need for training, Bass and Vaughan (1969) suggested 12 sources of credible input. Those sources particularly appropriate to analysis of custodial training needs are observation of performance, requests for training from employees, opinions of supervisory personnel, and tests relating to job knowledge.

Talbot and Ellis (1969) cautioned that input from workers and supervisors regarding training needs may not be adequate and may be misleading. Too frequently, answers are provided on the basis of what employees think upper levels of management want to hear. In addition, many of the responses are too general to provide adequate direction in developing the training program.

Kellogg (1967) suggested that the performance-appraisal process can be used as a valuable source of input for determining the content of in-service training programs. The longitudinal examination of individual and collective performance-appraisal data can point out common performance deficiencies and thereby indicate a priority of training needs.

Retraining of employees is required for both newly hired and experienced custodial employees. Gardner (1976) presented the argument that because of shifts in job assignments or changes in processes, it may be necessary to provide specific training for employees. This

is especially true in school-plant operation, where product use is frequently changed and new equipment is introduced to the job situation.

The Peters Study

Peters (1980) presented a project directed at developing and evaluating a systematic training-needs-analysis model for business and industrial training. He identified three major activities related to the training-needs-analysis process. These included performance-deficiency definition, analysis of the performance deficiency, and communication with management.

Peters developed a mini-model and a maxi-model for systematic performance analysis. The mini-model consisted of three stages:

Stage I -- Identify and define the performance deficiency

Stage II-- Analyze the performance deficiency and identify appropriate solutions

Stage III--Generate data related to the performance deficiency and communicate those data and recommended solutions to corporate management

Figure 2.2 presents a graphic description of the Peters mini-model.

Peters then analyzed each of the stages presented in his mini-model and broke each of the major stages into phases as follows:

Stage 1: Performance-Deficiency Definition

- Phase One: Verify Performance Deficiency
- Phase Two: Define Performance Deficiency

Stage II: Analysis of Performance Deficiency/Identify Solutions

- Phase Three: Determine Appropriate Detailed Analysis Procedure to Identify Training Needs
- Phase Four: Conduct Analysis

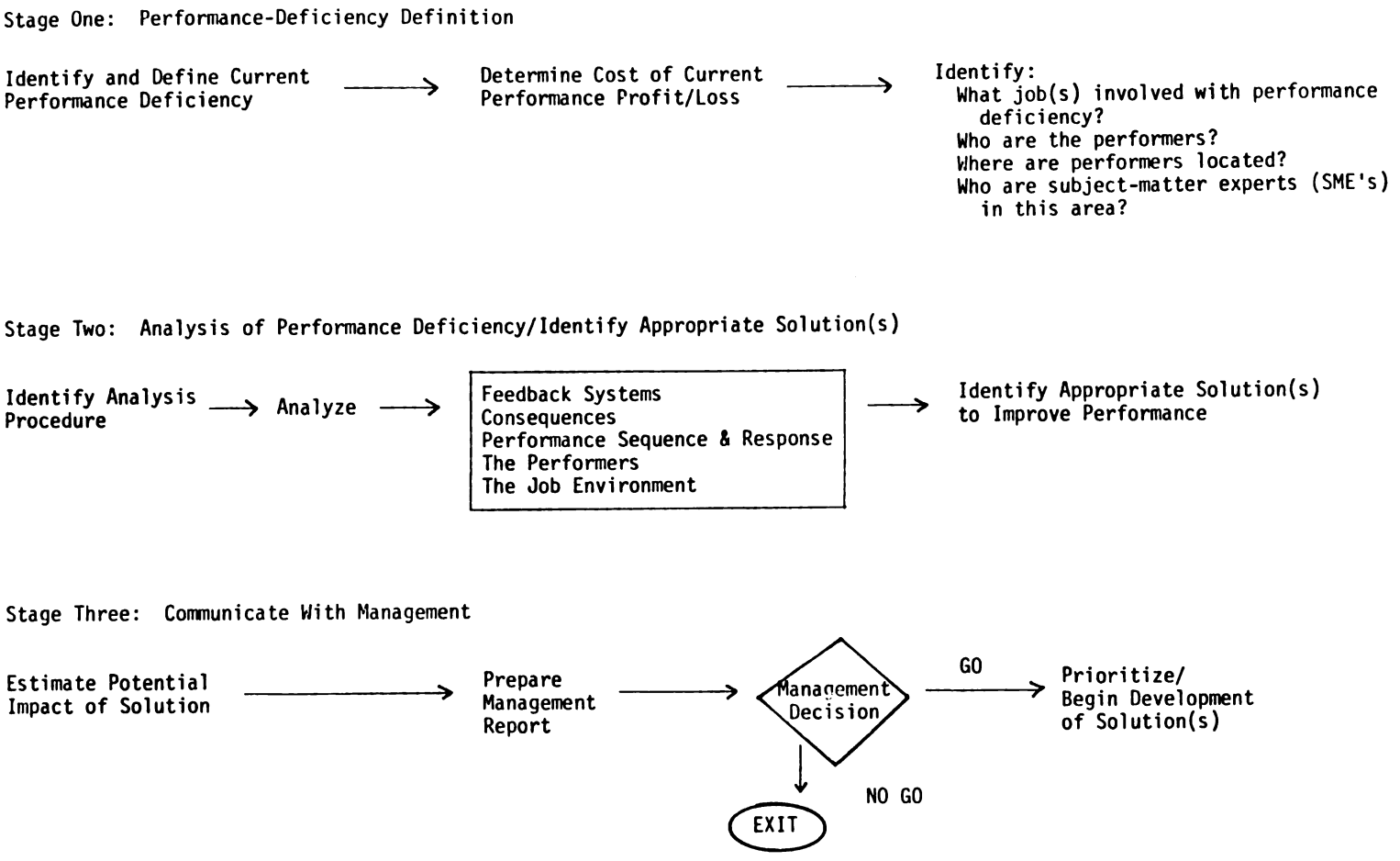

Figure 2.2.--Peters' mini-model of systematic performance analysis. (From Patrick V. Peters, "The Development and Evaluation of a Systematic Training Needs Analysis Model for Business/ Industrial Training," Ph.D. dissertation, Michigan State University, 1980.)

Phase Five: Identify Appropriate Solutions to Improve Performance

Phase Six: Analyze Identified Solutions

Stage III: Communicate With Management

Phase Seven: Communicate With Corporate Management

Phase Eight: Management Decision to Prioritize/ Implement Solution(s)

Figure 2.3 presents a graphic description of the Peters maxi-model.

The first three phases of the Peters maxi-model were the focus of concern in this research effort. Peters suggested the use of key informants, supervisors, and employee interviews as methods of verifying performance deficiencies. He suggested that once the performance deficiencies are identified, the gap between acceptable performance and current performance be defined in objective-measurable terms. The Peters model then requires that the training planner gather extensive data about the tasks to be performed and use those data in developing recommendations for the training program.

Managers of training programs at Chrysler Corporation, Ford Motor Company, and General Motors Corporation were asked to critique the Peters model. The managers unanimously agreed that the model provides an excellent theoretical base for the development of employee training programs. However, the managers also pointed out that the model demands a high level of expertise on the part of the training manager and requires extensive data in arriving at training decisions. These two requirements place severe limitations on use of the model, given the present resources and educational levels of many job trainers (Peters, 1970).

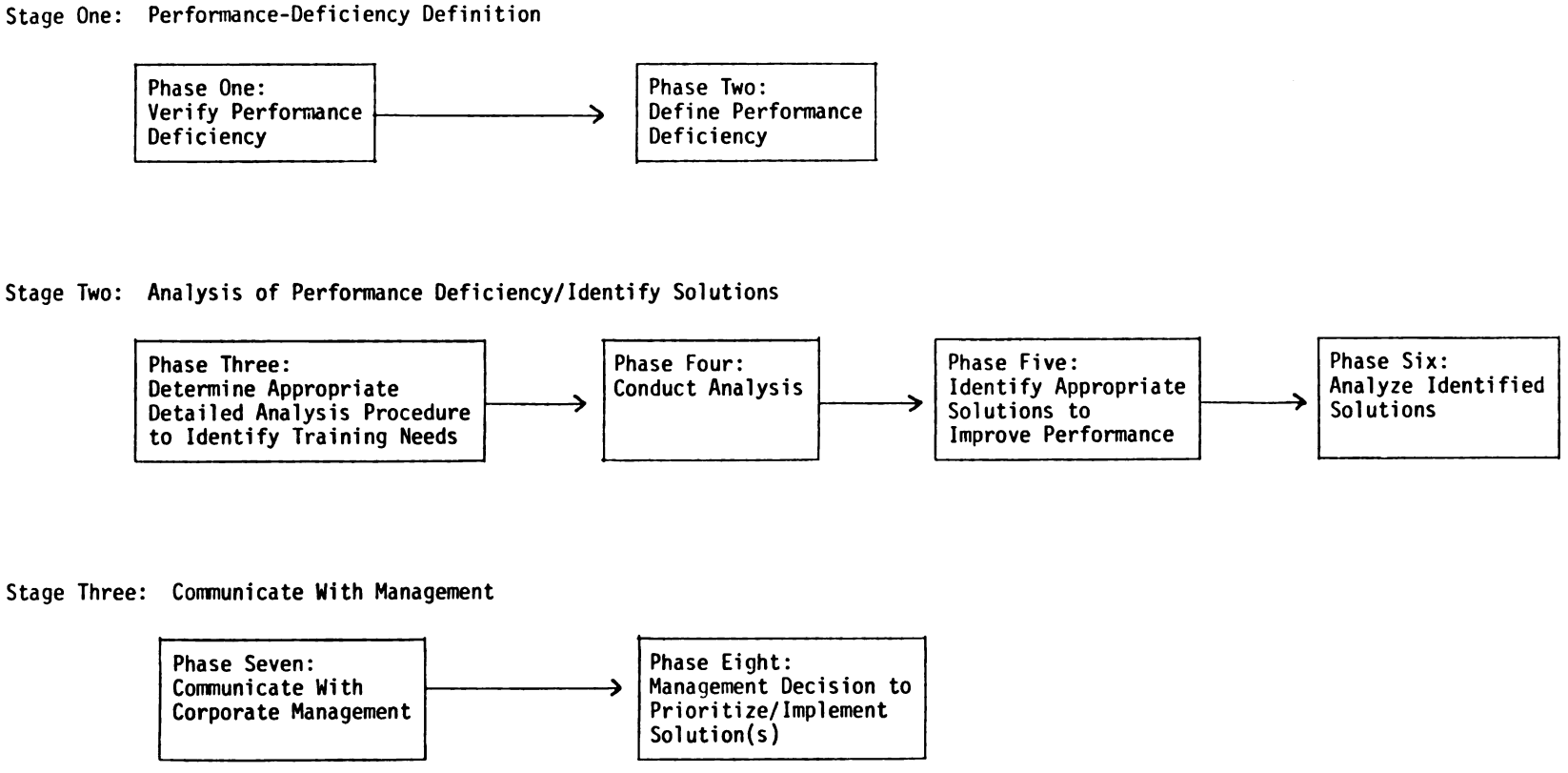

Figure 2.3.--Peters' maxi-model of systematic performance analysis. (From Patrick V. Peters, "The Development and Evaluation of a Systematic Training Needs Analysis Model for Business/Industrial Training," Ph.D. dissertation, Michigan State University, 1980.)

CHAPTER III

METHODS AND PROCEDURES

Design of the Study

The data for this study were collected from 55 Michigan school districts having enrollments between 2,500 and 4,000 students. The districts were identified using the Michigan Education Directory and Buyers Guide: 1981-82 Edition. School districts in the 2,500-4,000 size range were selected on the basis of the following assumptions:

1. These districts usually have an individual designated as supervisor of custodial employees.

2. They have a sufficient number of custodial positions to justify the implementation of a custodial training program.

3. Hiring for the custodial operation is done by a central supervisory or administrative person.

4. Custodians in these districts are expected to perform many of the routine preventative maintenance functions associated with daily operation of the school plant.

On February 1, 1982, surveys were mailed to the superintendents of 95 Michigan school districts that fell in the designated size range. The superintendent of each district was asked to cooperate by having the appropriate administrator or supervisor complete the survey instrument. In exchange for the district's cooperation,

each participant was promised a summary of the study conclusions.

The survey instrument consisted of four distinct parts, as follows:

Part I: General information was collected, including the number of buildings, total square footage served, and available man-hours.

Part II: Information was collected about the district's current selection and training procedures.

Part III: Respondents were requested to evaluate job skills on the basis of frequency, difficulty, and consequence of error.

Part IV: Respondents were asked to evaluate the training need for each of the job skills listed in Part III. Each skill was first ranked as being or not being an entry-level skill. The skills were then evaluated as to the appropriate type of training and the level of training need.

Development of the Questionnaire

One principal resource used in developing the questionnaire for this study was a list of job skills developed for the custodial training program offered by the Ingham Intermediate Career Center. The Career Center develops training modules for each occupational area included in its instructional program after surveying various institutions, businesses, and industries to determine which skills should be included in the training model.

Items 1 through 43 on the list of job skills included in the survey were selected from a list of 84 job skills included in the Career Center's custodial training programs. Although the survey contained 43 items relating to the Career Center's accepted job-skill list, those 43 items represented 61 of the accepted job skills. The 61 custodial job skills identified by the Career Center were condensed to 43 items on the questionnaire by combining closely related skills into a single questionnaire item. For example, the Career Center lists the separate job skills of "sealing a hard-surface floor" and "buffing a hard-surface floor." Since the items are very closely related, they were combined into one item on the questionnaire sent to custodial supervisors. Through this process, the questionnaire represented more job skills while limiting the number of responses required of those completing the questionnaire.

Job skills 44 through 60 on the questionnaire dealt almost exclusively with knowledge and skill related to the operation of school heating plants. One of the primary justifications for the development of custodial training programs has been that such programs will promote savings in plant operation. Therefore, it was felt that the questionnaire should include a relatively comprehensive evaluation of the training need for heating-plant-related job skills. These job skills were compiled from a list of heating-plant tasks outlined in a publication of the Illinois Association of School Boards (1979) and a survey of Minnesota school maintenance operations (1968).

Although the 12 items in Parts I and II of the questionnaire required single responses, some of those responses required substantial

research, i.e., total building square footage and custodial experience data. Therefore, it was considered important to limit the number of job skills included in the questionnaire.

The questionnaire, in its final form, required from 265 to 385 individual responses. Respondent interest was crucial to proper completion and return of the questionnaire. Of the 57 questionnaires that were returned, 48 were completed in a manner that permitted the use of data from the entire questionnaire. When partially completed questionnaires were included, data were available to represent 55 expert opinions on the job-skill evaluations requested in Parts III and IV of the survey instrument. Ninety-five Michigan school districts fell into the enrollment range of 2,500-4,000; hence the response of 55 districts amounted to 57.9 percent of the total sample surveyed.

Method of Analyzing Data

One basic objective of the study was to demonstrate the use of job analysis in making decisions about training needs for custodial employees. The questionnaire was designed to elicit expert opinions about 60 custodial job skills on the basis of frequency of performance, task difficulty, error consequence, and perceived training need. The data represent the pooled opinions of 55 experts.

The results of Parts I and II of the survey were intended to serve as indicators of current staffing practices, selection activities, and training methods for a simple majority of school districts falling within the enrollment parameters of the study. Data presented in these sections were not processed in any manner than would lead to conclusions about training needs or selection methods. The principal

value of these data is their illustration of the variation in such factors as man-hours per square foot, number of buildings, and custodial experience among school districts included in the study. These data emphasize the fact that such factors must be considered in developing training programs.

The data gathered from Parts III and IV of the questionnaire were used to establish a hierarchy based on the frequency, difficulty, error consequence, and training need factors. Statistical tests of significance were not used in analyzing the data. The collective judgment of the responding custodial supervisors was used to create individual and composite rankings of the factors.

Weighted rank orders were created by assigning a factor of "1" to the low end of a three-step ranking system, "2" to the middle category, and "3" to the top category. The weighting factors were applied as indicated in Figure 3.1.

Chapter IV contains an analysis of data elicited by the questionnaire.

Weighting Factor	Frequency	Difficulty	Error Consequence	Training Need
1	"low"	"low"	"minor"	"low"
2	"medium"	"medium"	"significant"	"moderate"
3	"high"	"high"	"serious or very serious"	"high"

Figure 3.1.--Weighting factor values.

CHAPTER IV

ANALYSIS OF DATA

Part I: Plant Data; Enrollment; Employee Experience, Selection, and Training

Questionnaire Items 1-3 required identification of the school district, student enrollment, and number and type of buildings. When the questionnaires were returned, it was found that there was a considerable amount of disagreement between enrollment figures reported by the respondents and those reported in the 1982 edition of the Michigan Education Directory and Buyers Guide. The investigator decided to use the enrollment figures reported by the respondents when performing calculations related to the study.

The number of buildings receiving daily custodial service ranged from 3 (Crestwood) to 12 (Grandville, Sault Ste. Marie, Tecumseh). The average number of buildings for the respondent districts was 7.5 (Appendix D).

The total square footage receiving daily custodial services was divided by district enrollment to determine the square footage per student (Appendix D). The square footage per student ranged from a high of 233 square feet (Madison Heights-Lamphere) to a low of 81 square feet (Ionia). The very large variation in space per student creates speculation that one of the factors that may be increasing the per-student plant operation and maintenance costs is the failure

of districts to reduce the plant size as enrollments decline. One conclusion of the American School and University (1981) survey of plant maintenance and operation was that the number of square feet per student has increased by 100-130 square feet over the past few years. Political pressure resulting from efforts to close buildings has contributed to the rising square-footage allotment and its accompanying influence on rising per-pupil costs.

Custodial workload was examined in terms of square footage per custodian and square footage per labor hour (Appendix E). Square footage per custodian ranged from a high of 28,436 square feet (Saline) to a low of 12,654 square feet (Otisville-Lakeville). The average square footage per custodian was 24,365 square feet. When the total square footage was divided by available labor hours, the results ranged from a high of 4,597 square feet per labor hour to a low of 926 per labor hour. The average square footage per labor hour was 2,676. If this average is multiplied by the typical eight-hour work shift, the result is 21,408 square feet per full-time custodian.

Analysis of the experience of the 1,173 custodians reported on in the survey showed that 14 percent were experienced when hired (Table 4.1). Of the existing composite custodial staff, 4 percent had less than one year of experience, whereas 65 percent had more than 5 years of experience (Table 4.1).

The informal method of training was by far the most frequently reported method of training custodians. This type of training was indicated by 89 percent of the respondent districts, whereas the most

infrequently reported training method was the independent method (4 percent) (Table 4.2).

Table 4.1.--Custodial experience.

A. Years of Experience

	Number of Custodians	Percent
0-1 year	43.5	4
2-3 years	192.0	16
4-5 years	181.0	15
More than 5 years	756.5	65
Total	1,173	100

B. Experienced When Hired

Number Experienced When Hired	Total Custodians in Study	Percent Exper. When Hired
168	1,173	14

The most commonly reported activities involved in employee selection were personal interviews (100 percent) and reference checks (95 percent). Eighteen percent of the respondents mentioned job-knowledge tests, whereas 13 percent indicated the use of performance tests (Table 4.3).

Survey responses indicated considerable confusion among respondents regarding the distinction between a job description and a job analysis. The questions should have been preceded by an

Table 4.2.--Distribution of custodial training methods (N = 55).

Training Method	Number of Responses
Formal training program presented to all new custodians; special training sessions presented for total custodial staff on regularly scheduled basis	4
New employees learn through experience on the job; supervisory staff or experienced custodians instruct new personnel as the job situations occur; in-service-type activities conducted on an irregular basis for all custodians	49
New employees learn the job independently; employee contacts experienced employees or supervisor when he/she has a problem	2
Other	0

Table 4.3.--Distribution of employee-selection activities (N = 55, multiple responses possible).

Activity	Number of Responses
Interview	55
Reference check	52
Test of reading ability	5
Test of writing ability	3
Job-knowledge test	10
Performance test	7

operational definition of the two terms. The tabulation of items dealing with the presence of job descriptions and/or analysis is therefore not reported in this study.

Part II: Respondent Ratings of Job Skill Frequency, Difficulty, and Error Consequence

Tables 4.4, 4.5, and 4.6 provide the raw-score data collected in Part III of the questionnaire. Respondents were asked to rate each of the 60 job skills on the basis of frequency of performance (low, medium, or high), difficulty of the task (low, medium, or high), and error consequence if the skill is not performed properly (minor, significant, or serious).

The weighting factors depicted in Figure 3.1 were applied to the raw-score data presented in Tables 4.4, 4.5, and 4.6. The resulting weighted scores for each criterion (frequency, difficulty, and error consequence) were constructed in rank order, as presented in Tables 4.4a, 4.5a, and 4.6a.

To create a single evaluation of the combined weighted ratings of the frequency, difficulty, and error-consequence criteria, a table was created by averaging the weighted score for the three criteria and placing the resultant scores in a rank-order listing. Table 4.7 presents the average or composite weighted rank ordering for the three job-skill evaluation criteria.

Table 4.4.--Respondent ratings of frequency of performance of job skills (N = 55).

Code No.	Skill Description	Low	Medium	High
1	Is able to sweep and dust-mop a hard-surface floor	2	18	35
2	Is able to scrub and damp-mop a hard-surface floor	6	34	15
3	Is able to disinfect a hard-surface floor	14	27	14
4	Is able to strip and wax a hard-surface floor	22	25	8
5	Is able to seal and buff a hard-surface floor	19	28	8
6	Is able to spray buff a hard-surface floor	24	24	7
7	Is able to operate a wet vacuum	16	28	11
8	Is able to sweep and mop stairways	11	20	24
9	Is able to clean a carpet using a rotary floor machine	29	22	4
10	Is able to clean a carpet using a dry foam machine method	35	18	2
11	Is able to clean a carpet using a steam cleaner method	36	16	3
12	Is able to clean a carpet using a water extractor method	35	16	4
13	Is able to clean a carpet using a dry cleaning method	35	17	3
14	Is able to fill soap dispenser, personal dispensers, and towel dispensers	7	18	30
15	Is able to clean lavatory sinks	0	16	39
16	Is able to clean mirrors	6	16	33
17	Is able to clean toilets and urinals	0	16	39
18	Is able to clean drains and traps	20	29	6
19	Is able to clean lamp fixtures and replace lamps	19	28	8
20	Is able to wash walls	25	23	7
21	Is able to clean windows	12	32	11
22	Is able to polish and dust furniture and fixtures	12	25	18
23	Is able to clean desk tops	13	24	18
24	Is able to clean drinking fountains	3	18	34
25	Is able to clean ceilings	39	12	4
26	Is able to adjust doors	41	11	3
27	Is able to glaze windows	42	10	3
28	Is able to caulk windows	38	14	3
29	Is able to replace electrical switches and receptacles	36	18	1
30	Is able to replace fuses	34	21	0
31	Is able to replace ballasts	35	18	2
32	Is able to paint interiors and exteriors	26	26	3
33	Is able to replace floor tile	39	15	1
34	Is able to seed and fertilize lawns	38	16	1
35	Is able to fertilize and prune shrubs	43	11	1

Table 4.4.--Continued.

Code No.	Skill Description	Low	Medium	High
36	Is able to mow lawns	19	29	7
37	Is able to receive goods	24	20	11
38	Is able to fill out shipping and receiving records	27	26	2
39	Is able to make security rounds and set door locks	9	21	25
40	Is able to activate alarm systems	29	16	10
41	Is able to call police and fire departments	43	9	3
42	Is able to telephone supervisors in emergency situations	35	16	4
43	Is able to use fire extinguisher for a particular fire	48	4	3
44	Is able to check steam boiler water treatment with PH test paper	31	16	8
45	Is able to blow down a steam boiler	26	20	9
46	Is able to read steam pressure gauges	18	20	17
47	Is able to determine operating status of boiler controls	22	18	15
48	Is able to check for vacuum in condensate line	32	18	5
49	Is able to check pneumatic controls for proper operation	25	26	4
50	Is able to service water conditioner	30	33	2
51	Is able to check air dryer for proper operation	25	24	6
52	Is able to drain water from compressor tanks	27	23	5
53	Is able to test low water cut-off valves	28	21	6
54	Is able to lubricate small electric motors	22	29	4
55	Is able to inspect and/or replace unit ventilator belts	32	21	2
56	Is able to clean unit ventilator filter	25	25	5
57	Is able to check heat valves for proper operation	26	25	4
58	Is able to check calibration of thermostats	26	26	3
59	Is able to drain and clean hot water heaters	44	10	1
60	Is able to repair or replace flush valves	38	16	1

Note: This table presents respondent ratings of the frequency of performance of each job skill. Respondents were asked to rate the skill as "low," "medium," or "high" in frequency of performance.

Table 4.4a.--Weighted rank order: Frequency of performance of job skills.

Code No.	Skill Description	Weighted Score	Rank Order
15	Is able to clean lavatory sinks	49.67	1.5
17	Is able to clean toilets and urinals	49.67	1.5
1	Is able to sweep and dust mop a hard-surface floor	47.67	3
24	Is able to clean drinking fountains	47.00	4
16	Is able to clean mirrors	45.67	5
14	Is able to fill soap dispenser, personal dispensers, and towel dispensers	44.33	6
39	Is able to make security rounds and set door locks	42.00	7
8	Is able to sweep and mop stairways	41.00	8
2	Is able to scrub and damp-mop a hard-surface floor	39.67	9
22	Is able to polish and dust furniture and fixtures	38.67	10
23	Is able to clean desk tops	38.33	11
3	Is able to disinfect a hard-surface floor	36.67	12
21	Is able to clean windows	36.33	13.5
46	Is able to read steam pressure gauges	36.33	13.5
7	Is able to operate a wet vacuum	35.00	15
47	Is able to determine operating status of boiler controls	34.33	16
50	Is able to service water conditioner	34.00	17
19	Is able to clean lamp fixtures and replace lamps	33.67	18
5	Is able to seal and buff a hard-surface floor	33.00	19
36	Is able to mow lawns	32.67	20
37	Is able to receive goods	32.33	21
4	Is able to strip and wax a hard-surface floor	32.00	22.5
18	Is able to clean drains and traps	32.00	22.5
6	Is able to spray buff a hard-surface floor	31.00	24.5
45	Is able to blow down a steam boiler	31.00	24.5
20	Is able to wash walls	30.67	26
54	Is able to lubricate small electric motors	30.67	27
40	Is able to activate alarm systems	30.33	28.5
51	Is able to check air dryer for proper operation	30.33	28.5
56	Is able to clean unit ventilator filters	30.00	30
49	Is able to check pneumatic controls for proper operation	29.67	31
52	Is able to drain water from compressor	29.33	33
53	Is able to test low water cut-off valves	29.33	33

Table 4.4a.--Continued.

Code No.	Skill Description	Weighted Score	Rank Order
57	Is able to check heat valves for proper operation	29.33	33
32	Is able to paint interiors and exteriors	29.00	36
44	Is able to check steam boiler water treatment with PH test paper	29.00	36
58	Is able to check calibration of thermostats	29.00	36
9	Is able to clean a carpet using a rotary floor machine	28.33	38.5
38	Is able to fill out shipping and receiving records	28.33	38.5
48	Is able to check for vacuum in condensate lines	27.67	40
55	Is able to inspect and/or replace unit ventilator belts	26.67	41
12	Is able to clean a carpet using a water extractor method	26.33	42.5
42	Is able to telephone supervisors in emergency situations	26.33	42.5
13	Is able to clean a carpet using a dry cleaning method	26.00	44
10	Is able to clean a carpet using a dry foam machine method	25.67	45
31	Is able to replace ballasts	25.67	45
30	Is able to replace fuses	25.33	47
25	Is able to clean ceilings	25.00	49
28	Is able to caulk windows	25.00	49
29	Is able to replace electrical switches and receptacles	25.00	49
34	Is able to seed and fertilize lawns	24.33	51.5
60	Is able to repair or replace flush valves	24.33	51.5
26	Is able to adjust doors	24.00	53.5
33	Is able to replace floor tile	24.00	53.5
27	Is able to glaze windows	23.67	55
41	Is able to call police and fire departments	23.33	56
35	Is able to fertilize and prune shrubs	22.67	57
11	Is able to clean a carpet using a steam cleaner method	22.33	58.5
59	Is able to drain and clean hot water heaters	22.33	58.5
43	Is able to use fire extinguisher for a particular fire	21.67	60

Note: This table presents the weighted score and the rank order of each job skill, based on frequency of performance. Weighted scores were produced by applying weighting factors (see Chapter III, p. 61) to the data presented in Table 4.4.

Table 4.5.--Respondent ratings of difficulty of job skills (N = 55).

Code No.	Skill Description	Low	Medium	High
1	Is able to sweep and dust-mop a hard-surface floor	42	11	2
2	Is able to scrub and damp-mop a hard-surface floor	28	22	5
3	Is able to disinfect a hard-surface floor	26	24	5
4	Is able to strip and wax a hard-surface floor	12	28	15
5	Is able to seal and buff a hard-surface floor	13	32	10
6	Is able to spray buff a hard-surface floor	13	37	5
7	Is able to operate a wet vacuum	36	18	1
8	Is able to sweep and mop stairways	40	14	1
9	Is able to clean a carpet using a rotary floor machine	10	34	11
10	Is able to clean a carpet using a dry foam machine method	14	36	5
11	Is able to clean a carpet using a steam cleaner method	11	22	22
12	Is able to clean a carpet using a water extractor method	10	27	18
13	Is able to clean a carpet using a dry cleaning method	13	34	8
14	Is able to fill soap dispenser, personal dispensers, and towel dispensers	46	6	3
15	Is able to clean lavatory sinks	37	16	2
16	Is able to clean mirrors	43	10	2
17	Is able to clean toilets and urinals	30	24	1
18	Is able to clean drains and traps	20	29	6
19	Is able to clean lamp fixtures and replace lamps	28	24	3
20	Is able to wash walls	32	22	1
21	Is able to clean windows	34	20	1
22	Is able to polish and dust furniture and fixtures	36	16	3
23	Is able to clean desk tops	36	19	0
24	Is able to clean drinking fountains	38	17	0
25	Is able to clean ceilings	24	24	7
26	Is able to adjust doors	6	25	24
27	Is able to glaze windows	4	28	23
28	Is able to caulk windows	6	29	20
29	Is able to replace electrical switches and receptacles	3	33	19
30	Is able to replace fuses	12	27	16
31	Is able to replace ballasts	3	29	23
32	Is able to paint interiors and exteriors	8	34	13
33	Is able to replace floor tile	9	32	14

Table 4.5.--Continued.

Code No.	Skill Description	Low	Medium	High
34	Is able to seed and fertilize lawns	14	37	4
35	Is able to fertilize and prune shrubs	12	28	15
36	Is able to mow lawns	25	26	4
37	Is able to receive goods	23	25	7
38	Is able to fill out shipping and receiving records	13	33	9
39	Is able to make security rounds and set door locks	22	28	5
40	Is able to activate alarm systems	18	30	7
41	Is able to call police and fire department	45	8	2
42	Is able to telephone supervisors in emergency situations	46	7	2
43	Is able to use fire extinguisher for a particular fire	20	29	6
44	Is able to check steam boiler water treatment with PH test paper	8	30	17
45	Is able to blow down a steam boiler	7	35	13
46	Is able to read steam pressure gauges	13	36	6
47	Is able to determine operating status of boiler controls	3	33	19
48	Is able to check for vacuum in condensate line	6	25	24
49	Is able to check pneumatic controls for proper operation	3	28	24
50	Is able to service water conditioner	9	32	14
51	Is able to check air dryer for proper operation	16	29	10
52	Is able to drain water from compressor tanks	29	20	6
53	Is able to test low water cut-off valves	18	31	6
54	Is able to lubricate small electric motors	16	36	3
55	Is able to inspect and/or replace unit ventilator belts	12	37	6
56	Is able to clean unit ventilator filter	18	35	2
57	Is able to check heat valves for proper operation	8	36	11
58	Is able to check calibration of thermostats	3	26	26
59	Is able to drain and clean hot water heaters	9	23	23
60	Is able to repair or replace flush valves	6	28	21

Note: This table contains respondent ratings of the level of difficulty of each job skill. Respondents were asked to rate the skill as "low," "medium," or "high" in difficulty of performance.

Table 4.5a.--Weighted rank order: Difficulty of job skills.

Code No.	Skill Description	Weighted Score	Rank Order
26	Is able to adjust doors	46.67	1
31	Is able to replace ballasts	45.33	2
58	Is able to check calibration of thermostats	44.33	3
49	Is able to check pneumatic controls for proper operation	43.67	4
27	Is able to glaze windows	43.00	5
48	Is able to check for vacuum in condensate lines	42.67	6
29	Is able to replace electrical switches and receptacles	42.00	7.5
47	Is able to determine operating status of boiler controls	42.00	7.5
60	Is able to repair or replace flush valves	41.67	9
28	Is able to caulk windows	41.33	10.5
59	Is able to drain and clean hot water heaters	41.33	10.5
11	Is able to clean a carpet using a steam cleaner method	40.33	12
44	Is able to check steam boiler water treatment with PH test paper	39.67	13
12	Is able to clean a carpet using a water extractor method	39.33	14
45	Is able to blow down a steam boiler	38.67	15
50	Is able to service water conditioner	38.33	17
32	Is able to paint interiors and exteriors	38.33	17
33	Is able to replace floor tile	38.33	17
30	Is able to replace fuses	38.00	19
4	Is able to strip and wax a hard-surface floor	37.67	21
35	Is able to fertilize and prune shrubs	37.67	21
57	Is able to check heat valves for proper operation	37.67	21
9	Is able to clean a carpet using a rotary floor machine	37.00	23
5	Is able to seal and buff a hard-surface floor	35.67	24
38	Is able to fill out shipping and receiving records	35.33	25
13	Is able to clean a carpet using a dry cleaning method	35.00	26
51	Is able to check air dryer for proper operation	34.67	27.5
55	Is able to inspect and/or replace unit ventilator belts	34.67	27.5
46	Is able to read steam pressure gauges	34.33	29
6	Is able to spray buff a hard-surface floor	34.00	30
10	Is able to clean a carpet using a dry foam machine method	33.67	31
34	Is able to seed and fertilize lawns	33.33	32
40	Is able to activate alarm systems	33.00	33

Table 4.5a.--Continued.

Code No.	Skill Description	Weighted Score	Rank Order
53	Is able to test low water cut-off valves	32.67	34
54	Is able to lubricate small electric motors	32.33	35
18	Is able to clean drains and traps	32.00	36.5
43	Is able to use fire extinguisher for a particular fire	32.00	36.5
37	Is able to receive goods	31.33	38.5
56	Is able to clean unit ventilator filters	31.33	38.5
25	Is able to clean ceilings	31.00	40.5
39	Is able to make security rounds and set door locks	31.00	40.5
3	Is able to disinfect a hard-surface floor	29.67	42.5
36	Is able to mow lawns	29.67	42.5
2	Is able to scrub and damp-mop a hard-surface floor	29.00	44.5
52	Is able to drain water from compressor tanks	29.00	44.5
19	Is able to clean lamp fixtures and replace lamps	28.33	46
17	Is able to clean toilets and urinals	27.00	47
20	Is able to wash walls	26.33	48
21	Is able to clean windows	25.67	49.5
22	Is able to polish and dust furniture and fixtures	25.67	49.5
14	Is able to fill soap dispenser, personal dispensers, and towel dispensers	25.33	51
7	Is able to operate a wet vacuum	25.00	52.5
15	Is able to clean lavatory sinks	25.00	52.5
23	Is able to clean desk tops	24.67	54
24	Is able to clean drinking fountains	24.00	55
8	Is able to sweep and mop stairways	23.67	56
1	Is able to sweep and dust mop a hard-surface floor	23.33	57
16	Is able to clean mirrors	23.00	58
41	Is able to call police and fire department	22.33	59
42	Is able to telephone supervisors in emergency situations	22.00	60

Note: This table presents the weighted score and rank order of each job skill, based on the difficulty of performance. Weighted scores were produced by applying weighting factors (see Chapter III, p. 51) to the data presented in Table 4.5.

Table 4.6.--Respondent ratings of error consequence.

Code No.	Skill Description	Minor	Significant	Serious
1	Is able to sweep and dust-mop a hard-surface floor	35	13	7
2	Is able to scrub and damp-mop a hard-surface floor	28	15	12
3	Is able to disinfect a hard-surface floor	23	18	14
4	Is able to strip and wax a hard-surface floor	14	22	19
5	Is able to seal and buff a hard-surface floor	23	17	15
6	Is able to spray buff a hard-surface floor	23	26	6
7	Is able to operate a wet vacuum	33	15	7
8	Is able to sweep and mop stairways	33	18	4
9	Is able to clean a carpet using a rotary floor machine	17	27	11
10	Is able to clean a carpet using a dry foam machine method	18	29	8
11	Is able to clean a carpet using a steam cleaner method	18	26	11
12	Is able to clean a carpet using a water extractor method	15	28	12
13	Is able to clean a carpet using a dry cleaning method	28	18	9
14	Is able to fill soap dispenser, personal dispensers, and towel dispensers	35	13	7
15	Is able to clean lavatory sinks	22	24	9
16	Is able to clean mirrors	25	18	2
17	Is able to clean toilets and urinals	20	23	12
18	Is able to clean drains and traps	14	26	15
19	Is able to clean lamp fixtures and replace lamps	27	25	3
20	Is able to wash walls	35	18	2
21	Is able to clean windows	36	18	1
22	Is able to polish and dust furniture and fixtures	39	13	3
23	Is able to clean desk tops	28	15	2
24	Is able to clean drinking fountains	22	20	13
25	Is able to clean ceilings	31	21	3
26	Is able to adjust doors	14	25	16
27	Is able to glaze windows	13	25	17
28	Is able to caulk windows	17	23	15
29	Is able to replace electrical switches and receptacles	11	15	29
30	Is able to replace fuses	16	20	19
31	Is able to replace ballasts	10	18	27
32	Is able to paint interiors and exteriors	13	31	11
33	Is able to replace floor tile	18	26	11

Table 4.6.--Continued.

Code No.	Skill Description	Minor	Significant	Serious
34	Is able to seed and fertilize lawns	20	25	10
35	Is able to fertilize and prune shrubs	15	27	13
36	Is able to mow lawns	26	20	9
37	Is able to receive goods	20	16	19
38	Is able to fill out shipping and receiving records	12	25	18
39	Is able to make security rounds and set door locks	12	7	36
40	Is able to activate alarm systems	17	8	30
41	Is able to call police and fire departments	15	4	36
42	Is able to telephone supervisors in emergency situations	14	12	29
43	Is able to use fire extinguisher for a particular fire	11	10	34
44	Is able to check steam boiler water treatment with PH test paper	4	20	31
45	Is able to blow down a steam boiler	7	13	35
46	Is able to read steam pressure gauges	8	13	34
47	Is able to determine operating status of boiler controls	3	14	38
48	Is able to check for vacuum in condensate line	1	20	34
49	Is able to check pneumatic controls for proper operation	2	19	34
50	Is able to service water conditioner	5	25	25
51	Is able to check air dryer for proper operation	6	25	24
52	Is able to drain water from compressor tanks	9	23	23
53	Is able to test low water cut-off valves	6	25	24
54	Is able to lubricate small electric motors	8	26	21
55	Is able to inspect and/or replace unit ventilator belts	6	32	17
56	Is able to clean unit ventilator filter	13	30	12
57	Is able to check heat valves for proper operation	8	23	24
58	Is able to check calibration of thermostats	5	26	24
59	Is able to drain and clean hot water heaters	2	32	21
60	Is able to repair or replace flush valves	7	30	18

Note: This table presents respondent ratings of the error consequence associated with each job skill. Respondents were asked to rate the skill as having a "minor," "significant," or "serious" error consequence if not performed properly.

Table 4.6a.--Weighted rank order: Error consequence of job skill.

Code No.	Skill Description	Weighted Score	Rank Order
47	Is able to determine operating status of boiler controls	41.55	1
48	Is able to check for vacuum in condensate lines	40.22	2
49	Is able to check pneumatic controls for proper operation	39.34	3
45	Is able to blow down a steam boiler	39.22	4
44	Is able to check steam boiler water treatment with PH test paper	38.78	5
46	Is able to read steam pressure gauges	38.66	6
39	Is able to make security rounds and set door locks	38.56	7
43	Is able to use fire extinguisher for a particular fire	38.55	8
41	Is able to call police and fire departments	38.11	9
50	Is able to service water conditioner	37.78	10
58	Is able to check calibration of thermostats	36.89	11.5
59	Is able to drain and clean hot water heaters	36.89	11.5
29	Is able to replace electrical switches and receptacles	36.56	14
51	Is able to check air dryer for proper operation	36.56	14
53	Is able to test low water cut-off valves	36.56	14
31	Is able to replace ballasts	36.33	16
57	Is able to check heat valves for proper operation	36.00	17
42	Is able to telephone supervisors in emergency situations	35.89	18
52	Is able to drain water from compressor tanks	35.67	19
40	Is able to activate alarm systems	35.55	20.5
54	Is able to lubricate small electric motors	35.55	20.5
55	Is able to inspect and/or replace unit ventilator belts	35.44	22
60	Is able to repair or replace flush valves	35.44	23
38	Is able to fill out shipping and receiving records	34.89	24
4	Is able to strip and wax a hard-surface floor	34.78	25
27	Is able to glaze windows	34.67	26
30	Is able to replace fuses	34.44	27
26	Is able to adjust doors	34.22	28
18	Is able to clean drains and traps	34.11	29
33	Is able to replace floor tile	33.89	30.5
37	Is able to receive goods	33.89	30.5
28	Is able to caulk windows	33.78	32
32	Is able to paint interiors and exteriors	33.78	33

Table 4.6a.--Continued.

Code No.	Skill Description	Weighted Score	Rank Order
35	Is able to fertilize and prune shrubs	33.78	34
12	Is able to clean a carpet using a water extractor method	33.67	35
9	Is able to clean a carpet using a rotary floor machine	33.34	36
11	Is able to clean a carpet using a steam cleaner method	33.33	37.5
33	Is able to replace floor tile	33.3	37.5
5	Is able to seal and buff a hard-surface floor	33.22	39.5
17	Is able to clean toilets and urinals	33.22	39.5
3	Is able to disinfect a hard-surface floor	32.78	41.5
24	Is able to clean drinking fountains	32.78	41.5
34	Is able to seed and fertilize lawns	32.67	43.5
10	Is able to clean a carpet using a dry foam machine method	32.67	43.5
16	Is able to clean lavatory sinks	32.55	45
2	Is able to scrub and damp-mop a hard-surface floor	32.33	46
6	Is able to spray buff a hard-surface floor	32.22	47.5
36	Is able to mow lawns	32.22	47.5
13	Is able to clean a carpet using a dry cleaning method	32.11	49
19	Is able to clean lamp fixtures and replace lamps	32.00	50
7	Is able to operate a wet vacuum	31.11	51
1	Is able to sweep and dust-mop a hard-surface floor	30.89	53
14	Is able to fill soap dispenser, personal dispensers, and towel dispensers	30.89	53
25	Is able to clean ceilings	30.89	53
8	Is able to sweep and mop stairways	30.56	55
20	Is able to wash walls	30.44	56
21	Is able to clean windows	30.33	57
22	Is able to polish and dust furniture	30.22	58
16	Is able to clean mirrors	30.00	59
23	Is able to clean desk tops	29.78	60

Note: This table presents the weighted score and the rank order of each job skill, based on the level of error consequence. Weighted scores were produced by applying weighting factors (see Chapter III, p. 51) to the data presented in Table 4.6.

Table 4.7.--Weighted rank order: Composite frequency, difficulty, and error consequence.

Code No.	Skill Description	Weighted Score	Rank Order
47	Is able to determine operating status of boiler controls	41.55	1
49	Is able to check pneumatic controls for proper operation	40.22	2
48	Is able to check for vacuum in condensate lines	39.34	3
39	Is able to make security rounds and set door locks	39.22	4
58	Is able to check calibration of thermostats	38.78	5
46	Is able to read steam pressure gauges	38.66	6
45	Is able to blow down a steam boiler	38.56	7
50	Is able to service water conditioner	38.55	8
44	Is able to check steam boiler water treatment with PH test paper	38.11	9
31	Is able to replace ballasts	37.78	10
17	Is able to clean toilets and urinals	36.89	11
29	Is able to replace electrical switches and receptacles	36.56	12
57	Is able to check heat valves for proper operation	36.33	13
4	Is able to strip and wax a hard-surface floor	36.00	14.5
26	Is able to adjust doors	36.00	14.5
51	Is able to check air dryer for proper operation	35.89	16
15	Is able to clean lavatory sinks	35.67	17
59	Is able to drain and clean hot water heaters	35.55	18
60	Is able to repair or replace flush valves	35.44	19
24	Is able to clean drinking fountains	34.89	21
27	Is able to glaze windows	34.89	21
53	Is able to test low water cut-off valves	34.89	21
40	Is able to activate alarm systems	34.78	23
54	Is able to lubricate small electric motors	34.67	24
32	Is able to paint interiors and exteriors	34.44	25
5	Is able to seal and buff a hard-surface floor	34.22	26
28	Is able to caulk windows	34.11	27.5
38	Is able to fill out shipping and receiving records	34.11	27.5
55	Is able to inspect and/or replace unit ventilator belts	33.89	29
12	Is able to clean a carpet using a water extractor method	33.22	30
18	Is able to clean drains and traps	33.67	31.5
30	Is able to replace fuses	33.67	31.5
3	Is able to disinfect a hard-surface floor	33.34	33

Table 4.7.--Continued.

Code No.	Skill Description	Weighted Score	Rank Order
2	Is able to scrub and damp-mop a hard-surface floor	33.33	35
9	Is able to clean a carpet using a rotary floor machine	33.33	35
37	Is able to receive goods	33.33	35
52	Is able to drain water from compressor tanks	33.22	37
1	Is able to sweep and dust-mop a hard-surface floor	32.78	38
43	Is able to use fire extinguisher for a particular fire	32.67	39
56	Is able to clean unit ventilator filters	32.55	40
11	Is able to clean a carpet using a steam cleaner method	32.33	41.5
14	Is able to fill soap dispenser, personal dispensers, and towel dispensers	32.33	41.5
33	Is able to replace floor tile	32.22	43
35	Is able to fertilize and prune shrubs	32.11	44
6	Is able to spray buff a hard-surface floor	32.00	45
36	Is able to mow lawns	31.11	46
10	Is able to clean a carpet using a dry foam machine method	30.89	47
8	Is able to sweep and mop stairways	30.56	48
13	Is able to clean a carpet using a dry cleaning method	30.44	49
16	Is able to clean mirrors	30.33	50.5
34	Is able to seed and fertilize lawns	30.33	50.5
19	Is able to clean lamp fixtures and replace lamps	30.22	52
42	Is able to telephone supervisors in emergency situations	30.00	53
41	Is able to call police and fire departments	29.78	54
22	Is able to polish and dust furniture and fixtures	29.67	55
7	Is able to operate a wet vacuum	29.33	56
21	Is able to clean windows	29.00	57
23	Is able to clean desk tops	28.11	58
25	Is able to clean ceilings	27.78	59
20	Is able to wash walls	27.66	60

Note: This table presents the composite weighted scores from Tables 4.4a, 4.5a, and 4.6a. The weighted scores for frequency, difficulty, and error consequence for each job skill were averaged and presented in rank order to produce this table.

Part III: Analysis of Training-Needs-Assessment Data

In Part IV of the questionnaire, supervisors were asked to evaluate which of the 60 given job skills they would consider as being entry skills, i.e., skills that should be possessed by the applicant before hiring. Table 4.8 presents the composite results of the entry-skill-level evaluation.

None of the skills was rated as an entry skill by a majority of the respondents. However, the ratings of those items involving routine custodial duties indicated that the custodial supervisors were more inclined to expect such skills to be entry level than they were to expect skills involving maintenance and heating-plant operation to be entry-level skills. The lowest number of "yes" responses consistently went to items involving heating-plant operation.

This part of the questionnaire also asked supervisors to indicate the type of training they considered most appropriate for each job skill. Very few of the respondents selected independent training for any of the job skills. Informal training was most frequently selected for skills involving routine custodial functions and building repair and maintenance. A majority of the respondents designated formal training for 9 of the 13 skills related to operation of the heating plant (Table 4.9).

Finally, Part IV of the questionnaire asked respondents to rate the level of need for training in each of the 60 job skills. Table 4.10 presents the raw-score data. In Table 4.10a, the data are weighted as described in Chapter III and presented in rank order.

Table 4.8.--Respondent evaluation of job-skill training needs: Entry skills.

Code No.	Skill Description	"Yes" Responses
1	Is able to sweep and dust-mop a hard-surface floor	22
2	Is able to scrub and damp-mop a hard-surface floor	10
3	Is able to disinfect a hard-surface floor	0
4	Is able to strip and wax a hard-surface floor	3
5	Is able to seal and buff a hard-surface floor	3
6	Is able to spray buff a hard-surface floor	2
7	Is able to operate a wet vacuum	8
8	Is able to sweep and mop stairways	18
9	Is able to clean a carpet using a rotary floor machine	3
10	Is able to clean a carpet using a dry foam machine method	5
11	Is able to clean a carpet using a steam cleaner method	5
12	Is able to clean a carpet using a water extractor method	4
13	Is able to clean a carpet using a dry cleaning method	5
14	Is able to fill soap dispenser, personal dispensers, and towel dispensers	14
15	Is able to clean lavatory sinks	19
16	Is able to clean mirrors	22
17	Is able to clean toilets and urinals	14
18	Is able to clean drains and traps	8
19	Is able to clean lamp fixtures and replace lamps	13
20	Is able to wash walls	20
21	Is able to clean windows	20
22	Is able to polish and dust furniture and fixtures	20
23	Is able to clean desk tops	21
24	Is able to clean drinking fountains	18
25	Is able to clean ceilings	16
26	Is able to adjust doors	7
27	Is able to glaze windows	6
28	Is able to caulk windows	6
29	Is able to replace electrical switches and receptacles	5
30	Is able to replace fuses	12
31	Is able to replace ballasts	5
32	Is able to paint interiors and exteriors	11
33	Is able to replace floor tile	8

Table 4.8.--Continued.

Code No.	Skill Description	"Yes" Responses
34	Is able to seed and fertilize lawns	9
35	Is able to fertilize and prune shrubs	7
36	Is able to mow lawns	24
37	Is able to receive goods	5
38	Is able to fill out shipping and receiving records	2
39	Is able to make security rounds and set door locks	8
40	Is able to activate alarm systems	3
41	Is able to call police and fire departments	17
42	Is able to telephone supervisors in emergency situations	14
43	Is able to use fire extinguisher for a particular fire	5
44	Is able to check steam boiler water treatment with PH test paper	4
45	Is able to blow down a steam boiler	4
46	Is able to read steam pressure gauges	5
47	Is able to determine operating status of boiler controls	5
48	Is able to check for vacuum in condensate line	5
49	Is able to check pneumatic controls for proper operation	5
50	Is able to service water conditioner	4
51	Is able to check air dryer for proper operation	4
52	Is able to drain water from compressor tanks	3
53	Is able to test low water cut-off valves	3
54	Is able to lubricate small electric motors	9
55	Is able to inspect and/or replace unit ventilator belts	3
56	Is able to clean unit ventilator filter	4
57	Is able to check heat valves for proper operation	4
58	Is able to check calibration of thermostats	6
59	Is able to drain and clean hot water heaters	4
60	Is able to repair or replace flush valves	2

Note: This table presents respondent evaluations of whether each job skill was a skill the employee was expected to possess upon being employed (entry skill).

Table 4.9.--Respondent evaluations of job-skill training: Type of training.

Code No.	Skill Description	Inde-pendent	Informal	Formal
1	Is able to sweep and dust-mop a hard-surface floor	0	29	4
2	Is able to scrub and damp-mop a hard-surface floor	1	37	8
3	Is able to disinfect a hard-surface floor	2	40	4
4	Is able to strip and wax a hard-surface floor	0	29	23
5	Is able to seal and buff a hard-surface floor	2	28	22
6	Is able to spray buff a hard-surface floor	3	43	7
7	Is able to operate a wet vacuum	4	39	4
8	Is able to sweep and mop stairways	5	30	2
9	Is able to clean a carpet using a rotary floor machine	0	32	20
10	Is able to clean a carpet using a dry foam machine method	1	32	17
11	Is able to clean a carpet using a steam cleaner method	1	25	24
12	Is able to clean a carpet using a water extractor method	0	28	23
13	Is able to clean a carpet using a dry cleaning method	4	31	15
14	Is able to fill soap dispenser, personal dispensers, and towel dispensers	10	27	4
15	Is able to clean lavatory sinks	4	25	7
16	Is able to clean mirrors	9	23	1
17	Is able to clean toilets and urinals	4	29	8
18	Is able to clean drains and traps	3	38	11
19	Is able to clean lamp fixtures and replace lamps	6	32	4
20	Is able to wash walls	6	26	3
21	Is able to clean windows	9	25	1
22	Is able to polish and dust furniture and fixtures	6	28	1
23	Is able to clean desk tops	8	25	1
24	Is able to clean drinking fountains	5	26	6
25	Is able to clean ceilings	7	29	3
26	Is able to adjust doors	3	28	17
27	Is able to glaze windows	4	26	19
28	Is able to caulk windows	4	30	15
29	Is able to replace electrical switches and receptacles	1	27	22
30	Is able to replace fuses	4	27	12
31	Is able to replace ballasts	2	33	15
32	Is able to paint interiors and exteriors	3	26	15
33	Is able to replace floor tile	3	31	13

Table 4.9.--Continued.

Code No.	Skill Description	Inde-pendent	Informal	Formal
34	Is able to seed and fertilize lawns	8	29	9
35	Is able to fertilize and prune shrubs	6	30	12
36	Is able to mow lawns	4	22	5
37	Is able to receive goods	11	27	12
38	Is able to fill out shipping and receiving records	3	35	15
39	Is able to make security rounds and set door locks	6	32	9
40	Is able to activate alarm systems	3	34	15
41	Is able to call police and fire departments	5	27	6
42	Is able to telephone supervisors in emergency situations	7	27	7
43	Is able to use fire extinguisher for a particular fire	2	31	17
44	Is able to check steam boiler water treatment with PH test paper	0	22	29
45	Is able to blow down a steam boiler	1	20	30
46	Is able to read steam pressure gauges	1	24	25
47	Is able to determine operating status of boiler controls	0	16	34
48	Is able to check for vacuum in condensate line	2	16	32
49	Is able to check pneumatic controls for proper operation	1	17	32
50	Is able to service water conditioner	0	19	32
51	Is able to check air dryer for proper operation	1	19	31
52	Is able to drain water from compressor tanks	2	26	24
53	Is able to test low water cut-off valves	0	23	29
54	Is able to lubricate small electric motors	3	25	18
55	Is able to inspect and/or replace unit ventilator belts	0	30	22
56	Is able to clean unit ventilator filter	5	28	18
57	Is able to check heat valves for proper operation	1	26	24
58	Is able to check calibration of thermostats	0	19	30
59	Is able to drain and clean hot water heaters	1	30	20
60	Is able to repair or replace flush valves	1	28	24

Note: This table presents respondent evaluations of the type of training most appropriate for each job skill. Definitions for training types are presented in Chapter I, p. 7.

Table 4.10.--Respondent evaluations of job-skill training: Need level.

Code No.	Skill Description	Low	Moderate	High
1	Is able to sweep and dust-mop a hard-surface floor	26	4	3
2	Is able to scrub and damp-mop a hard-surface floor	22	18	6
3	Is able to disinfect a hard-surface floor	22	17	7
4	Is able to strip and wax a hard-surface floor	12	23	17
5	Is able to seal and buff a hard-surface floor	11	28	13
6	Is able to spray buff a hard-surface floor	19	31	3
7	Is able to operate a wet vacuum	13	31	3
8	Is able to sweep and mop stairways	18	19	0
9	Is able to clean a carpet using a rotary floor machine	13	32	7
10	Is able to clean a carpet using a dry foam machine method	14	29	7
11	Is able to clean a carpet using a steam cleaner method	11	28	11
12	Is able to clean a carpet using a water extractor method	14	29	8
13	Is able to clean a carpet using a dry cleaning method	21	24	5
14	Is able to fill soap dispenser, personal dispensers, and towel dispensers	18	15	8
15	Is able to clean lavatory sinks	14	12	10
16	Is able to clean mirrors	18	11	4
17	Is able to clean toilets and urinals	12	16	13
18	Is able to clean drains and traps	19	27	6
19	Is able to clean lamp fixtures and replace lamps	24	16	2
20	Is able to wash walls	21	12	2
21	Is able to clean windows	18	16	1
22	Is able to polish and dust furniture and fixtures	17	16	2
23	Is able to clean desk tops	19	13	2
24	Is able to clean drinking fountains	15	15	7
25	Is able to clean ceilings	23	14	2
26	Is able to adjust doors	12	28	8
27	Is able to glaze windows	12	32	5
28	Is able to caulk windows	17	28	4
29	Is able to replace electrical switches and receptacles	12	28	10
30	Is able to replace fuses	17	20	6
31	Is able to replace ballasts	14	28	8
32	Is able to paint interiors and exteriors	14	23	7
33	Is able to replace floor tile	16	25	6

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Table 4.10.--Continued.

Code No.	Skill Description	Low	Moderate	High
34	Is able to seed and fertilize lawns	23	20	3
35	Is able to fertilize and prune shrubs	17	26	3
36	Is able to mow lawns	18	11	2
37	Is able to receive goods	21	25	4
38	Is able to fill out shipping and receiving records	18	26	9
39	Is able to make security rounds and set door locks	11	21	15
40	Is able to activate alarm systems	14	21	17
41	Is able to call police and fire departments	14	10	14
42	Is able to telephone supervisors in emergency situations	16	16	9
43	Is able to use fire extinguisher for a particular fire	15	19	16
44	Is able to check steam boiler water treatment with PH test paper	14	20	17
45	Is able to blow down a steam boiler	19	25	17
46	Is able to read steam pressure gauges	8	25	17
47	Is able to determine operating status of boiler controls	8	21	21
48	Is able to check for vacuum in condensate line	9	25	16
49	Is able to check pneumatic controls for proper operation	9	30	11
50	Is able to service water conditioner	15	31	5
51	Is able to check air dryer for proper operation	16	29	6
52	Is able to drain water from compressor tanks	18	27	7
53	Is able to test low water cut-off valves	12	30	10
54	Is able to lubricate small electric motors	11	27	8
55	Is able to inspect and/or replace unit ventilator belts	15	29	8
56	Is able to clean unit ventilator filter	19	23	9
57	Is able to check heat valves for proper operation	15	26	10
58	Is able to check calibration of thermostats	9	24	16
59	Is able to drain and clean hot water heaters	9	34	5
60	Is able to repair or replace flush valves	12	33	8

Note: This table presents respondent evaluations of the level of need for training--"low," "moderate," or "high"--for each job skill.

Table 4.10a.--Weighted rank order: Job-skill training need level.

Code No.	Skill Description	Weighted Score	Rank Order
47	Is able to determine operating status of boiler controls	37.67	1
45	Is able to blow down a steam boiler	37.00	2
46	Is able to read steam pressure gauges	36.33	3.5
4	Is able to strip and wax a hard-surface floor	36.33	3.5
6	Is able to spray buff a hard-surface floor	36.00	5
40	Is able to activate alarm systems	35.67	6.5
48	Is able to check for vacuum in condensate lines	35.67	6.5
5	Is able to seal and buff a hard-surface floor	35.33	8
44	Is able to check steam boiler water treatment with PH test paper	35.00	9.5
58	Is able to check calibration of thermostats	35.00	9.5
43	Is able to use fire extinguisher for a particular fire	34.67	11
49	Is able to check pneumatic controls for proper operation	34.00	13
53	Is able to test low water cut-off valves	34.00	13
60	Is able to repair or replace flush valves	34.00	13
9	Is able to clean a carpet using a rotary floor machine	33.67	15
11	Is able to clean a carpet using a steam cleaner method	33.33	16
29	Is able to replace electrical switches and receptacles	32.67	17.5
39	Is able to make security rounds and set door locks	32.67	17.5
12	Is able to clean a carpet using a water extractor method	32.00	19
38	Is able to fill out shipping and receiving records	32.33	21
55	Is able to inspect and/or replace unit ventilator belts	32.33	21
57	Is able to check heat valves for proper operation	32.33	21
10	Is able to clean a carpet using a dry foam machine method	31.67	23.5
26	Is able to adjust doors	31.67	23.5
31	Is able to replace ballasts	31.33	25
50	Is able to service water conditioner	30.67	28
51	Is able to check air dryer for proper operation	30.67	28
52	Is able to drain water from compressor tanks	30.67	28
56	Is able to clean unit ventilator filters	30.67	28
59	Is able to drain and clean hot water heaters	30.67	28
18	Is able to clean drains and traps	30.33	31
27	Is able to glaze windows	30.00	32
54	Is able to lubricate small electric motors	29.67	33

Table 4.10a.--Continued.

Code No.	Skill Description	Weighted Score	Rank Order
7	Is able to operate a wet vacuum	28.67	34.5
13	Is able to clean a carpet using a dry cleaning method	28.67	34.5
17	Is able to clean toilets and urinals	28.33	36.5
28	Is able to caulk windows	28.33	36.5
33	Is able to replace floor tile	28.00	38
37	Is able to receive goods	27.67	39
32	Is able to paint interiors and exteriors	27.00	40
3	Is able to disinfect a hard-surface floor	26.67	41
35	Is able to fertilize and prune shrubs	26.00	42
2	Is able to scrub and damp-mop a hard-surface floor	25.33	43.5
30	Is able to replace fuses	25.33	43.5
41	Is able to call police and fire departments	25.00	45.5
42	Is able to telephone supervisors in emergency situations	25.00	45.5
14	Is able to fill soap dispensers, personal dispensers, and towel dispensers	24.00	47.5
34	Is able to seed and fertilize lawns	24.00	47.5
15	Is able to clean lavatory sinks	22.67	49
24	Is able to clean drinking fountains	22.00	50
19	Is able to clean lamp fixtures and replace lamps	20.67	51
8	Is able to sweep and mop stairways	18.67	52
25	Is able to clean ceilings	18.33	53
21	Is able to clean windows	18.00	54.5
22	Is able to polish and dust furniture and fixtures	18.00	54.5
16	Is able to clean mirrors	17.33	56
20	Is able to wash walls	17.00	57.5
23	Is able to clean desk tops	17.00	57.5
36	Is able to mow lawns	15.33	59
1	Is able to sweep and dust mop a hard-surface floor	14.33	60

Note: This table presents the weighted score and rank order of each job skill, based on level of training need. Weighted scores were produced by applying weighting factors (see Chapter III, p. 51) to the data presented in Table 4.10.

Part IV: Identification of Training Priorities

The final stage of data analysis involved dividing the 60 job-skill items into three general categories: (1) routine custodial functions, (2) building maintenance and repair, and (3) heating-plant operation. The job-skill items in each category are as follows:

Routine Custodial Functions (33 items)

Code No.	Skill Description
1	Is able to treat a dust mop
2	Is able to sweep and dust-mop a hard-surface floor
3	Is able to disinfect a hard-surface floor
4	Is able to strip and wax a hard-surface floor
5	Is able to seal and buff a hard-surface floor
6	Is able to spray buff a hard-surface floor
7	Is able to operate a wet vacuum
8	Is able to sweep and mop stairways
9	Is able to clean a carpet using a rotary floor machine
10	Is able to clean a carpet using a dry foam machine method
11	Is able to clean a carpet using a steam cleaner method
12	Is able to clean a carpet using a water extractor method
13	Is able to clean a carpet using a dry cleaning method
14	Is able to fill soap dispenser, personal dispensers, and towel dispensers
15	Is able to clean lavatory sinks
16	Is able to clean mirrors
17	Is able to clean toilets and urinals
18	Is able to clean drains and traps
19	Is able to clean lamp fixtures and replace lamps
20	Is able to wash walls
21	Is able to clean windows
22	Is able to polish and dust furniture
23	Is able to clean desk tops
24	Is able to clean drinking fountains
25	Is able to clean ceilings
36	Is able to mow lawns
37	Is able to receive goods
38	Is able to fill out shipping and receiving records
39	Is able to make security rounds and set door locks
40	Is able to activate alarm system
41	Is able to call police and fire departments
42	Is able to telephone supervisors in emergency situations
43	Is able to use fire extinguisher for a particular fire

Building Maintenance and Repair (14 items)

Code No.	Skill Description
26	Is able to adjust doors
27	Is able to glaze windows
28	Is able to caulk windows
29	Is able to replace electrical switches and receptacles
30	Is able to replace fuses
31	Is able to replace ballasts
32	Is able to paint interiors and exteriors
33	Is able to replace floor tile
34	Is able to seed and fertilize lawns
35	Is able to fertilize and prune shrubs
50	Is able to service water conditioner
54	Is able to lubricate small electric motors
59	Is able to drain and clean hot water heaters
60	Is able to repair or replace flush valves

Heating-Plant Operation (13 items)

Code No.	Skill Description
44	Is able to check steam boiler water treatment with PH test paper
45	Is able to blow down a steam boiler
46	Is able to read steam pressure gauges
47	Is able to determine operating status of boiler controls
48	Is able to check for vacuum in condensate lines
49	Is able to check pneumatic controls for proper operation
51	Is able to check air dryer for proper operation
52	Is able to drain water from compressor tanks
53	Is able to test low water cut-off valves
55	Is able to inspect and/or replace unit ventilator belts
56	Is able to clean unit ventilator filters
57	Is able to check heat valves for proper operation
58	Is able to check calibration of thermostats

The job-skill items were then placed on a matrix, based on their position on the composite skill-evaluation ranking presented in Table 4.7. The rank-ordered job skills were divided into three equal categories identified as the top 20, middle 20, and bottom 20 on the matrix. The matrix is presented in Table 4.11.

Table 4.11.--Matrix of job-skill categories versus ranking on skill frequency, difficulty, and error consequence.

Skill Category	Rank Grouping		
	Top 20 (1)	Middle 20 (2)	Bottom 20 (3)
Routine custodial functions	5[a]	11[d]	17[g]
Building repair and maintenance	6[b]	5[e]	3[h]
Heating-plant operation	9[c]	4[f]	0[i]

Note: This table presents a division of the 60 job skills into three skill categories. The skills in each category were then placed in three ranking groups derived from the composite rank-order list presented in Table 4.11.

[a]Items 39, 17, 4, 15, 24.

[b]Items 50, 31, 29, 26, 59, 60.

[c]Items 47, 49, 48, 58, 46, 45, 44, 57, 51.

[d]Items 40, 5, 38, 12, 18, 3, 2, 9, 37, 1, 43.

[e]Items 27, 54, 32, 28, 30.

[f]Items 53, 55, 52, 56.

[g]Items 11, 14, 6, 36, 10, 8, 13, 16, 19, 42, 41, 22, 7, 21, 23, 25, 20.

[h]Items 33, 35, 34.

[i]No items.

Using the composite rank ordering of frequency, difficulty, and error consequence, the 20 most highly ranked skills are those listed in footnotes a, b, and c of Table 4.11. The top 20 skills include 5 of the 33 (15%) routine custodial-function skills, 6 of the

14 (43%) building repair and maintenance skills, and 9 of the 13 (69%) heating-plant operation skills.

The process outlined above was repeated using the rank orderings of level of training needs, as presented in Table 4.10a. Using the training-need rank order, the 20 most highly ranked skills are those listed in footnotes a, b, and c of Table 4.12. The top 20 skills include 10 of 33 (30%) routine custodial-function skills, 2 of 14 (15%) building repair and maintenance skills, and 8 of 13 (62%) heating-plant operation skills.

The two matrices presented in Tables 4.11 and 4.12 provide steps in identifying training priorities. Table 4.11, Column 1, identifies those job skills with a high composite ranking on the basis of frequency of performance, skill difficulty, and error consequence. Using this information in isolation for designing a training program would mean assuming that the high-ranking skills merit training solely on the basis of the three job-evaluation criteria. However, it is possible that even though particular skills rank high on the three-criteria evaluation, the level of training need may be relatively low.

The second step in identifying training needs from job-analysis data is represented in Table 4.12. Table 4.12, Column 1, identifies those job skills with high training-need rankings on the basis of the combined perceptions of the custodial supervisors.

Table 4.12.--Matrix of job-skill categories versus ranking on level of training need.

Skill Category	Rank Grouping		
	Top 20 (1)	Middle 20 (2)	Bottom 20 (3)
Routine custodial functions	10[a]	6[d]	17[g]
Building repair and maintenance	2[b]	9[e]	3[h]
Heating-plant operation	8[c]	5[f]	0[i]

Note: This table presents a division of the 60 job skills in three skill categories. The skills in each category were then placed in three ranking groups derived from the composite rank-order list presented in Table 4.10a.

[a]Items 4, 6, 40, 5, 43, 9, 11, 39, 12, 38.

[b]Items 60, 29.

[c]Items 47, 45, 46, 48, 44, 58, 49, 53.

[d]Items 10, 18, 7, 13, 17, 37.

[e]Items 26, 31, 50, 59, 27, 54, 28, 33, 32.

[f]Items 55, 57, 51, 52, 56.

[g]Items 3, 2, 41, 42, 14, 16, 24, 19, 8, 25, 21, 22, 16, 20, 23, 36, 1.

[h]Items 35, 30, 34.

[i]No items.

Table 4.13 presents the job skills that were ranked in the top 20 both in job-skill evaluation and level of training need. The job skills by category are as follows:

Routine Custodial Function

Code No.	Skill Description
4	Is able to strip and wax a hard-surface floor
39	Is able to make security rounds and set door locks

Building Repair and Maintenance

Code No.	Skill Description
29	Is able to replace electrical switches and receptacles
60	Is able to repair or replace flush valves

Heating-Plant Operation

Code No.	Skill Description
44	Is able to check steam boiler water treatment with PH test paper
45	Is able to blow down a steam boiler
46	Is able to read steam pressure gauges
47	Is able to determine operating status of boiler controls
48	Is able to check for vacuum in condensate lines
49	Is able to check pneumatic controls for proper operation
58	Is able to check calibration of thermostats

Table 4.13.--Job skills appearing in the top 20 ranking on both the matrix of composite frequency, difficulty, and error consequence and the matrix of training-need level.

Skill Category	Job-Skill Item Numbers
Routine custodial functions	4, 39
Building repair and maintenance	29, 60
Heating-plant operation	44, 45, 46, 47, 48, 49, 58

Note: This table presents a combination of data from Tables 4.11 and 4.12. The table specifies the items ranked in the top 20 category both on the basis of skill evaluation and training-need assessment.

The combination of data from the job-skill evaluation and the supervisors' assessment of training needs provides a method for increasing the precision for selecting the content of job-training programs. The training-program content is selected through two independent procedures: (1) evaluation of job skills on the basis of frequency, difficulty, and error consequence; and (2) assessment of training needs on the basis of the subjective judgments of custodial/maintenance supervisors. If the items finally selected for inclusion in the training program are those that were ranked high through both procedures, the probability of selecting items that are truly high-training-need job skills is greatly increased.

The problem addressed in this study was the development of training programs for support personnel. One major criterion for developing training programs is that the program be targeted on significant training needs. The dual approach followed in this study results in a greater assurance that the training-program content will be meaningful to employees and will result in improved efficiency of the support operation.

The procedure followed in the study also provides a long-range guidance element for deciding on the content of future training programs. The creation of the rank-order list of job skills allows the training-program manager to move on to lower-level training needs as time and resources permit. However, it would appear prudent for school officials to conduct a periodic reevaluation of training needs. This reevaluation would serve as an assessment of the effectiveness

of the training program and as a method of adjusting training programs to changes in technology, the aging of buildings, and changes in the membership of the custodial/maintenance staff.

CHAPTER V

SUMMARY AND CONCLUSIONS

Summary of the Study

The purpose of the study was to demonstrate a method of using job analysis as a basis for identifying training needs and improving selection of employees. The position of school custodian was selected for use in the study. A job analysis for the position was constructed by combining skill analyses from a career center training program for custodians and skill descriptions from two state education departments.

A questionnaire was developed and mailed to custodial supervisors in 95 Michigan school districts having enrollments of 2,500 to 4,000 students. The supervisors were asked to complete the four-part questionnaire providing data on facilities and staffing characteristics, selection and training information, evaluation of 60 job skills, and training-needs assessment for the same 60 job skills.

The data regarding facilities and staffing and selection and training were compiled and reported as background information for the study. Data from the evaluation of job skills and the training-needs assessment of job skills were compiled and processed to produce rank orderings on four job-skill criteria: (1) frequency, (2) difficulty, (3) error consequence, and (4) level of training need. These data were then placed in a cross-matrix of three categories of job skills

with three ranking groups. The following conclusions and recommendations are based on the data provided by the questionnaires.

Conclusions

1. A wide variety of staffing levels and facility factors exist in the schools included in the survey.

2. Methods of selecting custodians have changed very little over the past 30 years. In 1954, Barbour found the personal interview and reference check to be the most common activities used in employee selection. This investigator also found a heavy reliance on the interview and reference check.

3. Custodial/maintenance supervisors had low expectations that job applicants would possess the necessary job skills. Of the 60 job skills listed on the questionnaire, not one skill was listed as an entry skill by a majority of the supervisors. The expectations of the supervisors appeared to be consistent with the fact that 86 percent of the custodial group represented in this study had not had custodial experience before being hired by the school districts.

4. The custodial supervisors' opinions were not consistent with practice in the matter of providing training programs. Four supervisors cited the existence of formal training programs, yet a majority of the respondents specified formal training programs as being most appropriate for job skills related to heating-plant operations.

5. The greatest need for employee training exists in job skills involving heating-plant operation. Heating-plant job skills

generally ranked high in both difficulty and error consequence. The matrix tables 4.11 and 4.12 showed a majority of these job skills in the top one-third of the rank-order listings.

6. Evaluating job skills on the basis of frequency, difficulty, and error consequence appears to yield priority rankings that are useful in identifying training priorities. The composite rank ordering developed through the use of the frequency, difficulty, and error-consequence factors had a rather high level of agreement with the ranking obtained by directly asking the supervisors to rate the level of need for training.

7. Supervisors relied heavily on informal training as a method of teaching job skills. Informal training was defined as on-the-job learning, with the supervisor or experienced employees instructing the new employee as the new job skills become necessary. In addition, informal training included irregularly scheduled in-service activities. The supervisors saw this method as being appropriate for all job skills except those related to heating-plant operation.

Recommendations for Further Study

The results of this study indicate that training of custodial employees is a very important management function. Although this study provided data on only one group of support employees, it is suspected that studies of other support employee groups would yield similar results: (1) low experience levels upon entering the job and (2) heavy reliance on informal training.

Recommendation: Study selection and training methods currently practiced by other support groups in school districts of the size studied in this research project.

The current study focused on job skills. Job performance is related to three factors: (1) skills, (2) knowledge, and (3) abilities. Successful performance in school support jobs also requires a variety of abilities, many of which are in the area of communications and human relations.

Recommendation: Replicate the current study using another support position in which job abilities would be the focus, i.e., secretarial position, with focus on communication and human-relations abilities.

The existence of support-staff training programs is related to top management's attitudes toward the value of such programs. The tremendous rise in utility costs and the corresponding effect on plant-operation costs have caused many school administrators to become more conscious of the value of competent employees in support-staff positions.

Recommendation: Conduct an in-depth study of a school district that has implemented training programs for classified personnel. Trace training activities that may be related to cost control.

Training programs are often developed on the basis of availability of training material or perceived need of supervisors or

employees. Many times these training programs are not targeted at the job skills that are in greatest need for training.

Recommendation: Select a school district that has developed support-staff training programs. Develop a job analysis for the appropriate support personnel and evaluate the job skills in the manner employed in this study. Compare the resulting priority training areas with those actually being pursued through the district's training program.

General Recommendations and Implications

Assuming that the methodology presented in this study is a reasonable approach for identifying high-priority training needs, school administrators are still confronted with the task of marshaling resources to conduct training programs. It is reasonable to expect that increasing financial restrictions affecting Michigan school districts will create a significant barrier to developing support-staff training programs. These restrictions, however, need not mean that school districts have no avenue through which in-service training might be provided.

School officials must consider the possibility of developing consortium training programs coordinated through intermediate school districts. Consortium arrangements for providing support-personnel training programs would be appropriate for approximately 500 of Michigan's 574 school districts. Each of these districts has an enrollment of fewer than 5,000 students, yet combined they serve

45 percent of the state's public school students. The intermediate school district becomes the logical organizational vehicle through which these medium- to small-enrollment districts may provide quality training programs.

As the consortium approach to training is developed, school districts might consider better ways of using local resources in staffing the training programs. Individual districts may have personnel who have developed a high level of expertise in a particular area. These persons can be "loaned" to neighboring school districts to conduct training programs or can serve as the instructional agents in multi-district training efforts. Such reciprocal uses of exceptionally able support personnel can result in a higher quality training program with a minimal commitment of extra expenditures on the part of local school districts.

Another source of training expertise is available through community resource people. Usually, there are citizens in the community who are involved in various trades directly related to school support operations. Many of these individuals are quite civic-minded and more than willing to devote some of their time and experience to improving the level of competence of school employees.

In the event that training programs cannot be staffed either through use of in-house personnel or community resource people, school districts can pool their resources to obtain consultant services. In some cases, the services of outside consultants can be obtained for a reasonably modest fee. Consultants may be provided by governmental agencies, by universities or colleges, or by local industry. Regardless

of the size of the consultant fee, sharing the cost would allow the local school district to provide a higher quality training program at a cost lower than would be possible without the consortium arrangement.

Training programs for custodial/maintenance personnel should be directed toward increasing the confidence of these workers in the area of preventative and routine maintenance. Most school districts are staffed at a level that provides only the necessary man-hours to carry out daily operating tasks. The training program should not be directed at major maintenance items such as roof repair or replacement of boilers. These major maintenance tasks and major building renovations should be provided on a subcontract basis. To involve regular staff members in extensive, major maintenance projects would result in a fragmentation and interruption of scheduling for preventative maintenance. The dilution of the preventative maintenance effort would, in turn, lead to a steady decline in the overall operating efficiency of the school's physical plant.

This study identified 11 items as having high training priority. Those items were as follows:

1. Stripping and waxing hard-surface floors
2. Making building security checks
3. Replacing electrical switches and receptacles
4. Repairing and/or replacing flush valves
5. Checking steam boiler water treatment
6. Blowing down steam boilers
7. Reading steam pressure gauges
8. Determining operating status of boiler controls

9. Checking for vacuum in condensate lines
10. Checking pneumatic controls for proper operation
11. Checking calibration of thermostats

A review of these items provides ample evidence that training programs should be directed toward routine custodial duties and preventative maintenance tasks. The skills embodied in carrying out these tasks are the core of a well-managed custodial/maintenance program.

APPENDICES

APPENDIX A

LETTER TO SUPERINTENDENTS

February 11, 1982

This is a request for your participation in a project designed to illustrate how job analysis may be used in the selection and training of custodial personnel. I am undertaking this project as the topic of my doctoral dissertation at Michigan State University. My committee has allowed me the flexibility to deal with this rather specific project because of the practical outcomes which may result.

Although the use of job analysis as a tool for selection and training is the major focus of the study, it is the underlying premise of the study that I feel provides its most meaningful justification. That premise is that through improved selection and training of support personnel we will be able to reduce costs of the support operations. I chose the school custodian position as the specific case because of the significant effect this person can have on plant operating costs, especially utility costs.

Your participation in this project will be greatly appreciated. Please have the survey instrument completed by the person responsible for hiring and supervising your custodial employees. In return for your participation, I will provide you with the results and recommendations of the study.

Thank you for your assistance. A self-addressed, postage-paid envelope is provided for your convenience in returning the questionnaire. Your efforts to promptly complete and return this survey are greatly appreciated.

Sincerely,

Glenn R. Doran,
Superintendent

I would sincerely appreciate your assistance in this project. Glenn, as a former business manager and now as superintendent, has worked with me in this area for several years. I feel the project's methodology and finding will be of value to districts which are attempting to improve the quality of their support operations.

Stanley Hecker, Professor
Michigan State University

APPENDIX B

THE SURVEY QUESTIONNAIRE

PART I: General Information

1. SCHOOL DISTRICT_____

2. ENROLLMENT_____

3. NUMBER OF BUILDINGS

Elementary	_____
Middle/Junior High	_____
High School	_____
Other	_____

4. SQUARE FOOTAGE REQUIRING DAILY CUSTODIAL SERVICES:_____ sq.ft.

5. TOTAL CUSTODIAL LABOR HOURS PER DAY:_____

PART II: Custodial Selection/Training Information

1. How many custodians currently employed?_____

2. How many were experienced custodians when hired?_____

3. Do you have job descriptions for custodial positions? ___Yes ___No

4. Do you have a job analysis for the custodial position? ___Yes ___No

5. How many custodians have total experience of:
   _____0-1 year
   _____2-3 years
   _____4-5 years
   _____more than 5 years

6. Which description best describes your method of training custodians?

   _____(a) formal training program presented to all new custodians, special training sessions presented for total custodial staff on a regularly scheduled basis

   _____(b) new employees learn through experience on the job, supervisory staff or experienced custodians instruct new personnel as the job situations occur, in-service type activities conducted on an irregular basis for all custodians

PART III: SKILL EVALUATION

Directions: Please complete each column category (Frequency, Difficulty, Error Consequence) for each job skill listed below. Each line should contain three "X"s. The first item is a sample item illustrating how the items are to be completed.

Code No.	Skill Description	Frequency Code: L = Low, M = Medium, H = High			Difficulty Code: L = Low, M = Medium, H = High			Error Consequence Code: M = Minor, SIG = Significant, S = Serious, VS = Very Serious			
		L	M	H	L	M	H	M	SIG	S	VS
Sample	Is able to treat a dust mop		x		x			x			
1	Is able to sweep and dust mop a hard-surface floor										
2	Is able to scrub and damp-mop a hard-surface floor										
3	Is able to disinfect a hard-surface floor										
4	Is able to strip and wax a hard-surface floor										
5	Is able to seal and buff a hard-surface floor										
6	Is able to spray buff a hard-surface floor										
7	Is able to operate a wet vacuum										
8	Is able to sweep and mop stairways										
9	Is able to clean a carpet using a rotary floor machine										
10	Is able to clean a carpet using a dry foam machine method										
11	Is able to clean a carpet using a steam cleaner method										
12	Is able to clean a carpet using a water extractor method										
13	Is able to clean a carpet using a dry cleaning method										
14	Is able to fill soap dispenser, personal dispensers, and towel dispensers										

Code No.	Skill Description	Frequency Code: L = Low, M = Medium, H = High			Difficulty Code: L = Low, M = Medium, H = High			Error Consequence Code: M = Minor, SIG = Significant, S = Serious, VS = Very Serious			
		L	M	H	L	M	H	M	SIG	S	VS
15	Is able to clean lavatory sinks										
16	Is able to clean mirrors										
17	Is able to clean toilets and urinals										
18	Is able to clean drains and traps										
19	Is able to clean lamp fixtures and replace lamps										
20	Is able to wash walls										
21	Is able to clean windows										
22	Is able to polish and dust furniture and fixtures										
23	Is able to clean desk tops										
24	Is able to clean drinking fountains										
25	Is able to clean ceilings										
26	Is able to adjust doors										
27	Is able to glaze windows										
28	Is able to caulk windows										
29	Is able to replace electrical switches and receptacles										
30	Is able to replace fuses										

Code No.	Skill Description	Frequency Code: L = Low M = Medium H = High			Difficulty Code: L = Low M = Medium H = High			Error Consequence Code: M = Minor SIG = Significant S = Serious VS = Very Serious			
		L	M	H	L	M	H	M	SIG	S	VS
31	Is able to replace ballasts										
32	Is able to paint interiors and exteriors										
33	Is able to replace floor tile										
34	Is able to seed and fertilize lawns										
35	Is able to fertilize and prune shrubs										
36	Is able to mow lawns										
37	Is able to receive goods										
38	Is able to fill out shipping and receiving records										
39	Is able to make security rounds in a building and set door locks										
40	Is able to activate alarm systems										
41	Is able to call police and fire departments										
42	Is able to telephone supervisors in emergency situations										
43	Is able to use fire extinguisher for a particular fire										
44	Is able to check steam boiler water treatment with PH test paper										
45	Is able to blow down a steam boiler										

Code No.	Skill Description	Frequency Code: L = Low M = Medium H = High			Difficulty Code: L = Low M = Medium H = High			Error Consequence Code: M = Minor SIG = Significant S = Serious VS = Very Serious			
46	Is able to read steam pressure gauges										
47	Is able to determine operating status of boiler controls										
48	Is able to check for vacuum in condensate lines										
49	Is able to check pneumatic controls for proper operation										
50	Is able to service water conditioner										
51	Is able to check air dryer for proper operation										
52	Is able to drain water from compressor tanks										
53	Is able to test low water cut-off valves										
54	Is able to lubricate small electric motors										
55	Is able to inspect and/or replace unit ventilator belts										
56	Is able to clean unit ventilator filters										
57	Is able to check heat valves for proper operation										
58	Is able to check calibration of thermostats										
59	Is able to drain and clean hot water heaters										
60	Is able to repair or replace flush valves										

PARV IV: TRAINING NEEDS ASSESSMENT

Directions:

You are now requested to evaluate the job skills identified in Part III in terms of training needs. If you feel a particular skill should be possessed by the applicant when hired, check the column marked "Entry Skill." If you feel the skill is not an "Entry Skill," please indicate whether you feel the skill can be learned independently, with informal training, or with formal training using the following definitions:

independent training:

The employee is able to develop acceptable skill level simply through the experience of performing a task several times without the aid of an instruction manual or coaching from other personnel.

informal training:

The employee is able to develop acceptable job skills through reading an instruction manual, asking questions, and/or through coaching from other personnel.

formal training:

The employee is able to develop acceptable job skills after participating in a training session which was scheduled to teach a specific skill. These training sessions may be in a classroom or on the job but in either case are prearranged and are operated on the assumption that the employee will not be learning the skill through independent or informal training.

Finally, please indicate the level of need for job skill training among your custodial staff (low, moderate, high).

Note: If you mark a skill as "Entry Skill," you are finished with that item. If an item is <u>not</u> marked as "Entry Skill," you should complete the other <u>two</u> categories: Type of Training and Need Level.

Code No.	Skill Description	Entry Skill	Type of Training			Need Level		
			Independent	Informal	Formal	Low	Moderate	High
Sample	Is able to treat a dust mop			x		x		
1	Is able to sweep and dust mop a hard-surface floor							
2	Is able to scrub and damp-mop a hard-surface floor							
3	Is able to disinfect a hard-surface floor							
4	Is able to strip and wax a hard-surface floor							
5	Is able to seal and buff a hard-surface floor							
6	Is able to spray buff a hard-surface floor							
7	Is able to operate a wet vacuum							
8	Is able to sweep and mop stairways							
9	Is able to clean a carpet using a rotary floor machine							
10	Is able to clean a carpet using a dry foam machine method							
11	Is able to clean a carpet using a steam cleaner method							
12	Is able to clean a carpet using a water extractor method							
13	Is able to clean a carpet using a dry cleaning method							
14	Is able to fill soap dispenser, personal dispensers, and towel dispensers							
15	Is able to clean lavatory sinks							

Code No.	Skill Description	Entry Skill	Type of Training			Need Level		
			Independent	Informal	Formal	Low	Moderate	High
16	Is able to clean mirrors							
17	Is able to clean toilets and urinals							
18	Is able to clean drains and traps							
19	Is able to clean lamp fixtures and replace lamps							
20	Is able to wash walls							
21	Is able to clean windows							
22	Is able to polish and dust furniture and fixtures							
23	Is able to clean desk tops							
24	Is able to clean drinking fountains							
25	Is able to clean ceilings							
26	Is able to adjust doors							
27	Is able to glaze windows							
28	Is able to caulk windows							
29	Is able to replace electrical switches and receptacles							
30	Is able to replace fuses							

Code No.	Skill Description	Entry Level	Type of Training			Need Level		
			Independent	Informal	Formal	Low	Moderate	High
31	Is able to replace ballasts							
32	Is able to paint interiors and exteriors							
33	Is able to replace floor tile							
34	Is able to seed and fertilize lawns							
35	Is able to fertilize and prune shrubs							
36	Is able to mow lawns							
37	Is able to receive goods							
38	Is able to fill out shipping and receiving records							
39	Is able to make security rounds in a building and set door locks							
40	Is able to activate alarm systems							
41	Is able to call police and fire departments							
42	Is able to telephone supervisors in emergency situations							
43	Is able to use fire extinguisher for a particular fire							
44	Is able to check steam boiler water treatment with PH test paper							
45	Is able to blow down a steam boiler							

Code No.	Skill Description	Entry Skill	Type of Training			Need Level		
			Independent	Informal	Formal	Low	Moderate	High
46	Is able to read steam pressure gauges							
47	Is able to determine operating status of boiler controls							
48	Is able to check for vacuum in condensate lines							
49	Is able to check pneumatic controls for proper operation							
50	Is able to service water conditioner							
51	Is able to check air dryer for proper operation							
52	Is able to drain water from compressor tanks							
53	Is able to test low water cut-off valves							
54	Is able to lubricate small electric motors							
55	Is able to inspect and/or replace unit ventilator belts							
56	Is able to clean unit ventilator filters							
57	Is able to check heat valves for proper operation							
58	Is able to check calibration of thermostats							
59	Is able to drain and clean hot water heaters							
60	Is able to repair or replace flush valves							

APPENDIX C

MICHIGAN PUBLIC SCHOOL DISTRICTS HAVING ENROLLMENTS OF 2,500-4,000 STUDENTS: 1981-1982

District	County	Enrollment
1. Algonac	St. Clair	3,165
2. Allegan	Allegan	2,736
3. Allen Park*	Wayne	2,819
4. Alma*	Gratiot/Montcalm	3,036
5. Auburn Heights	Oakland	2,781
6. Battle Creek-Harper Creek	Calhoun	2,913
7. Battle Creek-Lakeview	Calhoun	3,602
8. Bay City-Bangor	Bay	3,783
9. Birch Run	Saginaw	2,540
10. Cadillac*	Wexford	3,608
11. Carleton	Monroe	2,943
12. Caro*	Tuscola	2,559
13. Cedar Springs*	Kent	2,550
14. Centerline*	Macomb	3,685
15. Charlotte	Eaton	3,648
16. Cheboygan	Cheboygan	2,598
17. Chesaning*	Saginaw	3,343
18. Clawson	Oakland	2,500
19. Coldwater*	Branch	3,600
20. Comstock	Kalamazoo	2,721
21. Corunna*	Shiawassee	2,879
22. Dearborn Heights*	Wayne	3,200
23. Dearborn Heights-Crestwood*	Wayne	2,573
24. Dowagiac*	Cass	3,550
25. Durand*	Shiawassee	2,960
26. Eaton Rapids*	Eaton/Ingham	3,150
27. Ecorse	Wayne	2,561
28. Fenton*	Genesee	3,087
29. Fruitport*	Muskegon	2,875
30. Gaylord*	Otsego	2,650
31. Grand Rapids-Kenowa Hills	Kent	2,672
32. Grand Rapids-Northview*	Kent	2,888
33. Grandville*	Kent	3,849

District	County	Enrollment
34. Greenville*	Montcalm/Ionia/Kent	3,410
35. Gwinn*	Marquette	3,215
36. Hartland*	Livingston	3,511
37. Hastings	Barry	3,745
38. Hudsonville*	Ottawa	2,540
39. Inkster	Wayne	3,774
40. Inkster-Cherry Hill	Wayne	2,350
41. Inkster-Westwood	Wayne	3,185
42. Ionia*	Ionia	3,000
43. Jackson Northwest*	Jackson	3,700
44. Lake Odessa-Lakewood*	Ionia	2,810
45. Lansing-Waverly	Ingham/Eaton/Clinton	3,796
46. Linden*	Genesee	2,647
47. Lowell	Kent	2,850
48. Ludington*	Mason	2,736
49. Madison Heights	Oakland	3,100
50. Madison Heights-Lamphere*	Oakland	3,273
51. Marshall*	Calhoun	2,682
52. Marysville*	St. Clair	2,500
53. Mason	Ingham	3,434
54. Melvindale-Northern Allen	Wayne	3,014
55. Milan*	Washtenaw	2,600
56. Monroe-Jefferson*	Monroe	2,950
57. Mt. Morris*	Genesee	3,210
58. Muskegon-Mona Shores	Muskegon	3,975
59. Muskegon-Reeths-Puffer	Muskegon	3,825
60. Muskegon Heights	Muskegon	3,130
61. Northville*	Oakland	3,551
62. Novi	Oakland	3,187
63. Oak Park*	Oakland	3,550
64. Okemos*	Ingham	3,287
65. Ortonville-Brandon	Oakland	3,064
66. Oscoda	Iosco	3,500

District	County	Enrollment
67. Otisville-LakeVille*	Genesee	3,074
68. Oxford*	Oakland	3,040
69. Pinckney*	Livingston/Washtenaw	3,550
70. Pinconning	Bay/Gladwin	2,900
71. Plainwell*	Allegan	2,591
72. Redford-South Redford*	Wayne	3,191
73. Remus-Chippewa Hills*	Mecosta	2,600
74. Richland-Gull Lake*	Kalamazoo	2,690
75. River Rouge*	Wayne	2,924
76. Riverview*	Wayne	2,900
77. Rockford	Kent	3,896
78. Rockwood-Gibralter*	Wayne	3,998
79. Saginaw-Buena Vista	Saginaw	2,450
80. St. Clair Shores-Lakeview*	Macomb	3,730
81. St. Johns*	Clinton/Gratiot	3,761
82. St. Joseph*	Berrien	2,983
83. Saline*	Washtenaw	3,046
84. Sault Ste. Marie*	Chippewa	3,800
85. South Haven*	VanBuren	3,000
86. South Lyon	Oakland	4,000
87. Stevensville-Lakeshore*	Berrien	3,194
88. Sturgis	St. Joseph	2,808
89. Tecumseh*	Lenawee	3,435
90. Three Rivers	St. Joseph	3,391
91. Vicksburg*	Kalamazoo	2,620
92. Warren-Fitzgerald	Macomb	3,415
93. West Branch-Rose City*	Ogenaw	2,544
94. Ypsilanti-Lincoln	Washtenaw	3,004
95. Ypsilanti-Willow Run	Washtenaw	3,935

APPENDIX D

COMPARISON OF NUMBER AND TYPES OF BUILDINGS, ENROLLMENT, AND SQUARE FOOTAGE PER STUDENT

District	Types and Number of Buildings					Enrollment	Square Footage Per Student
	Elementary	Middle or Junior High	High School	Other	Total		
Allen Park	3	1	1	1	6	2,819	...
Alma	4	1	1	0	6	3,072	157
Cadillac	5	1	1	2	9	3,585	...
Caro	3	5	5	0	4	2,700	85
Cedar Springs	1	1	2	1	5	2,550	103
Centerline	4	2	1	3	10	3,685	148
Chesaning	4	1	1	1	7	3,140	136
Coldwater	5	1	1	2	9	3,606	111
Corunna	3	1	1	1	6	2,690	128
Dearborn Heights-Crestwood	1	1	1	0	3	2,500	116
Dearborn Heights	3	1	1	0	5	2,995	104
Dowagiac	5	2	1	3	11	3,424	87
Durand	5	1	1	1	8	2,912	91
Eaton Rapids	4	1	1	3	9	3,200	132
Fenton	3	1	1	1	6	3,152	148
Fruitport	3	1	1	0	5	3,100	120
Gaylord	3	1	1	0	5	2,607	85
Grand Rapids-Northview	3	2	1	3	9	2,794	122
Grandville	6	1	1	4	12	3,849	119
Greenville	4	1	1	5	11	3,415	...

District	Types and Number of Buildings					Enrollment	Square Footage Per Student
	Elementary	Middle or Junior High	High School	Other	Total		
Gwinn	4	1	1	0	6	3,354	119
Hartland	5	1	1	0	7	3,455	139
Hudsonville	6	1	1	0	8	2,505	112
Ionia	4	1	1	0	6	3,000	81
Jackson Northwest	3	2	1	1	7	3,584	153
Lake Odessa-Lakewood	4	2	1	0	7	2,973	103
Linden	3	1	1	1	6	2,556	97
Ludington	6	1	1	0	8	2,749	122
Madison Heights-Lamphere	4	1	1	3	9	3,000	233
Marshall	4	1	1	0	6	2,700	148
Marysville	2	1	1	1	5	2,380	145
Milan	1	1	1	0	3	2,555	109
Monroe-Jefferson	2	1	1	1	5	2,761	105
Mt. Morris	3	2	1	0	6	3,340	99
Northville	4	2	1	2	9	3,551	163
Oak Park	6	1	1	2	10	3,617	...
Okemos	4	1	1	3	9	3,170	156
Otisville-Lakeville	4	1	1	1	7	3,078	82
Oxford	3	1	1	0	5	3,112	122
Pinckney	4	1	1	1	7	3,609	124

District	Types and Number of Buildings					Enrollment	Square Footage Per Student
	Elementary	Middle or Junior High	High School	Other	Total		
Plainwell	4	1	1	5	11	2,700	170
Redford-South Redford	4	1	1	1	7	3,171	...
Remus-Chippewa Hills	4	1	1	0	6	2,548	167
Richland-Gull Lake	4	1	1	0	6	2,683	...
River Rouge	4	.5	.5	0	5	2,900	180
Riverview	3	1	1	0	5	2,793	163
Rockwood-Gibralter	6	1	1	2	10	4,117	109
St. Clair Shores-Lakeview	6	1	1	0	8	3,715	121
St. Johns	7	1	1	1	10	3,872	106
St. Joseph	6	1	1	0	8	2,865	205
Saline	3	1	1	0	5	3,049	153
Sault Ste. Marie	7	1	1	3	12	3,797	...
South Haven	5	1	1	1	8	3,165	110
Stevensville-Lakeshore	3	1	1	0	5	3,291	111
Tecumseh	7	1	1	3	12	3,400	94
Vicksburg	4	1	1	0	6	2,627	117
West Branch-Rose City	2	2	1	1	6	2,464	111

APPENDIX E

COMPARISON OF SQUARE FOOTAGE PER CUSTODIAN AND SQUARE FOOTAGE PER LABOR HOUR

District	Square Footage	No. of Custodians	Square Footage Per Custodian	Total Labor Hours	Square Footage Per Labor Hour
Allen Park	...	37	...	...	...
Alma	482,747	14	34,482	105	4,597
Cadillac	...	20	...	160	...
Caro	230,000	11	16,428	112	2,053
Cedar Springs	263,125	7	37,589	284	926
Centerline	547,300	34	16,097	272	2,012
Chesaning	430,000	20	21,500	154	2,792
Coldwater	402,435	18.5	21,753	148	2,719
Corunna	344,918	13	26,532	103	3,348
Dearborn Heights-Crestwood	290,000	20	14,510	106	2,735
Dearborn Heights	311,590	16	19,474	128	2,434
Dowagiac	300,000	19	15,789	152	1,973
Durand	265,956	12	22,163	94	2,829
Eaton Rapids	425,000	17	25,000	142	2,992
Fenton	468,132	14	33,438	...	...
Fruitport	372,023	18	20,667	144	2,583
Gaylord	223,400	12.5	17,872	100	2,234
Grand Rapids-Northview	342,663	17	20,156	129	2,656
Grandville	460,668	19.6	23,503	159	2,897
Greenville	...	15	...	120	...
Gwinn	400,000	20.5	19,512	164	2,439

District	Square Footage	No. of Custodians	Square Footage Per Custodian	Total Labor Hours	Square Footage Per Labor Hour
Hartland	481,902	17	28,347	136	3,543
Hudsonville	281,418	10	28,141	80	3,517
Ionia	245,000	13	18,846	104	2,355
Jackson Northwest	548,800	21	26,133	168	3,266
Lake Odessa-Lakewood	307,166	13.5	22,753	104	2,953
Linden	250,000	15	16,666	114	2,192
Ludington	337,370	22	15,335	176	1,916
Madison Heights-Lamphere	700,000	40	17,500	320	2,187
Marshall	400,000	16	25,000	128	3,125
Marysville	346,329	17	20,372	136	2,546
Milan	280,000	12	23,333	89	3,146
Monroe-Jefferson	289,974	21	13,808	168	1,726
Mt. Morris	332,922	23	14,474	184	1,809
Northville	581,254	33	17,613	264	2,201
Oak Park	...	52	...	416	...
Okemos	497,640	34	14,636	270	1,843
Otisville-Lakeville	253,086	20	12,654	152	1,665
Oxford	381,433	20	19,071	160	2,383
Pinckney	450,000	23	19,565	184	2,445

District	Square Footage	No. of Custodians	Square Footage Per Custodian	Total Labor Hours	Square Footage Per Labor Hour
Plainwell	460,000	21	21,900	168	2,738
Redford-South Redford	...	30	...	240	...
Remus-Chippewa Hills	428,000	16	26,750	128	3,343
Richland-Gull Lake	...	14	...	112	...
River Rouge	523,211	24	21,800	192	2,725
Rockwood-Gibralter	450,000	29	15,517	234	1,923
St. Clair Shores-Lakeview	450,000	34	13,235	272	1,654
St. Johns	411,000	26	15,807	208	1,975
St. Joseph	590,000	25	23,600	200	2,950
Saline	469,200	16.5	28,436	132	3,554
Sault Ste. Marie	...	33	...	264	...
South Haven	350,000	15.5	22,580	123	2,845
Stevensville-Lakeshore	368,465	18	20,470	144	2,558
Tecumseh	322,000	25	12,880	176	1,829
Vicksburg	307,655	14	21,975	112	2,746
West Branch-Rose City	275,356	10	27,535	80	3,441

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