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ABSTRACT

Designed to be of value to both occupational curriculum personnel and those persons concerned with noncurriculum issues of occupational description and updating of job content information, this volume is the second of a five-volume set describing a systematic approach for constructing task inventories, surveying the task performance of occupations, and analyzing survey data to determine the appropriate performance content for job training. This volume guides the user through an explicit set of procedural steps for developing comprehensive lists of task statements pertaining to the work done in a particular occupation, function, or cluster of related occupations. In sections 1 and 2, the user is introduced to the nature and characteristics of a task statement. Various problems likely to be encountered when constructing such statements of work activity are also discussed in section 2. Additional procedural steps for the reviewing, editing, and pilot testing of task statements prior to their subsequent use in occupational survey questionnaires are described in section 3. (SH)

Research and Development Series No. 122

PERFORMANCE CONTENT FOR JOB TRAINING

VOLUME 2

STATING THE TASKS OF THE JOB

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The Ohio State University
1960 Kenny Road
Columbus, Ohio 43210

March 1977

An Interim Report
on a Project Conducted under
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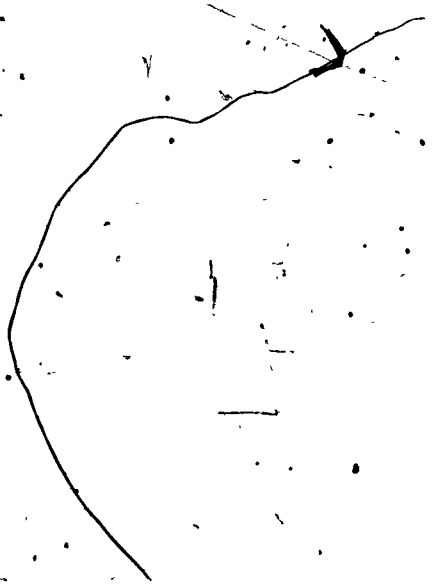

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U.S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE

National Institute of Education

THE CENTER MISSION STATEMENT

The Center for Vocational Education's mission is to increase the ability of diverse agencies, institutions, and organizations to solve educational problems relating to individual career planning, preparation, and progression. The Center fulfills its mission by:

- Generating knowledge through research
- Developing educational programs and products
- Evaluating individual program needs and outcomes
- Installing educational programs and products
- Operating information systems and services
- Conducting leadership development and training programs

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FOREWORD TO VOLUME 2

The Center for Vocational Education is continuing its programmatic research efforts to develop more effective procedures for identifying valid and necessary curriculum content. One interim product of this effort is the five-volume description of procedures for constructing task inventories, surveying the task performance of occupations, and analyzing survey data to aid curriculum planners and developers in determining the appropriate performance content for job training. The procedures are intended to be of value to both occupational curriculum personnel and those persons concerned with non-curriculum issues of occupational description and updating of job content information.

This set of procedures revises and considerably expands upon the earlier initial version of task inventory and survey procedures in The Center's R&D Series No. 91, *Procedures for constructing and using task inventories*, March 1973. The initial procedures profited greatly and drew heavily from the report by Joseph Morsh and Wayne Archer at the USAF Personnel Research Laboratory, *Procedural guide for conducting occupational surveys in the United States Air Force*. Center development of the inventory and survey process has concentrated on their adaptation to purposes of helping in the derivation of curriculum content. This adaptation has included greater concern of how a task is stated, what task information should be obtained, and how to use this task information in selecting the more relevant and critical content that warrants consideration as a learning objective.

The total set of volumes in this series consists of the following titles:

Volume 1: *Introduction*

Volume 2: *Stating the tasks of the job*

Volume 3: *Identifying relevant job performance.*

Volume 4: *Deriving performance requirements for training*

Volume 5: *Processing survey data: Technical appendices*

This focus upon the performance content of specific occupations is parallel to The Center's concern for the conceptual and affective content of training, as published in the earlier R&D Series No. 98 and 105. Results of several research applications of portions of the process at it was being developed are published as R&D Series No. 86, 87, 88, 108, 109, and 110. Currently underway is an exploratory study of more generally applicable skills that may be used in different occupational areas as well as within a particular occupation. Such occupationally transferable skills or competencies would seem to be useful complements to the present concern for job-specific content.

Volume 2, Stating the Tasks of the Job, guides the reader through an explicit set of procedural steps, beginning with guidelines on how to define the scope and limits of the occupational interest for a particular inventory and survey. The volume introduces the reader to the nature and characteristics of a task statement. It then discusses various problems likely to be encountered when constructing such statements of work activity. Additional procedural steps are described for the reviewing, editing, and pilot testing of task statements prior to their subsequent use in occupational survey questionnaires.

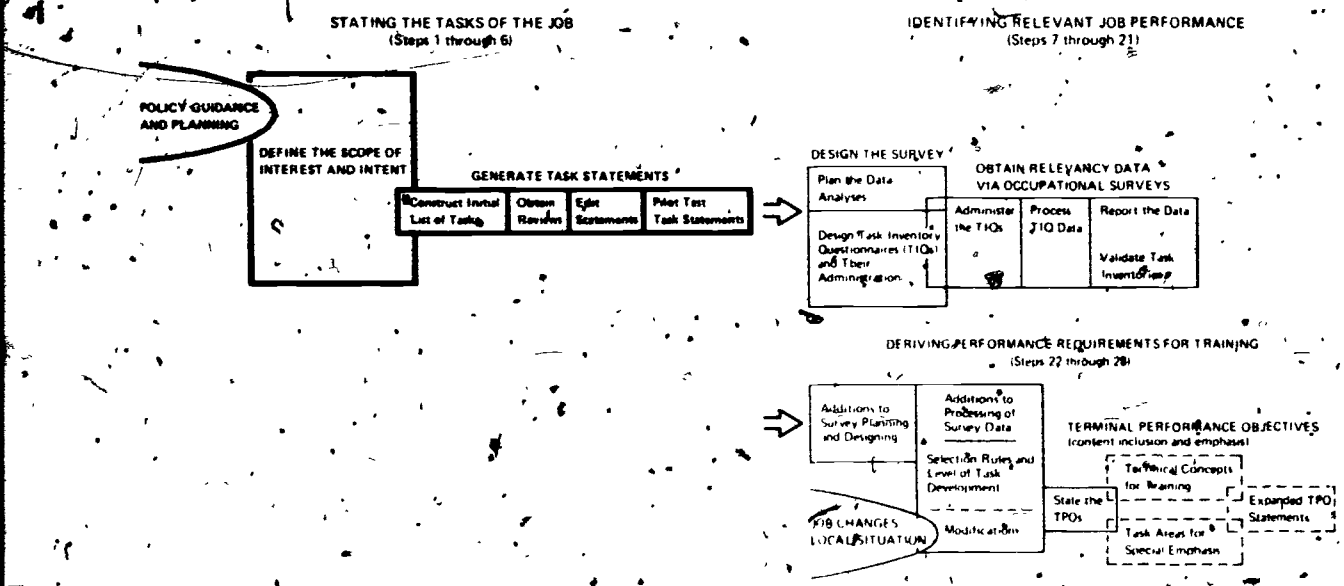
The procedures benefit from a variety of reported research studies and experiences of many persons over the last several years, notably that work sponsored and conducted by the USAF Personnel Research Laboratory. There also has been extensive input from the many vocational educators, curriculum developers, occupational instructors, employers, job supervisors, and workers themselves who have been involved in various aspects of trying out different portions of the process reported here.

Of special importance to the development of this volume were Frank Pratzner and Winston Horne, who provided valued support of the importance of the issues of scope definition and the form of task statements. Dr. Pratzner was director of the R&D program in which the five volumes of this set were developed. Aiding in the development of the variables of concern to defining the intended scopes of occupational interest, even extended beyond what is reported here, were Allen Wiant and Donald Cruickshank. The work of which this volume is a part was sponsored by the Education and Work Group of the National Institute of Education, with Robert Stump serving as Project Officer.

Continued improvement of the methodology can be anticipated as wider experience is gained in the implementation of task inventories and occupational surveys. It is hoped the present procedural descriptions may be of immediate use and value in aiding and promoting such implementation. By such means there should be increasing assurance that curriculums and instructional materials provide for those things most appropriately learned in a training program, and that students will be learning skills which are important to and required for effective job performance.

Robert E. Taylor
Executive Director
Center for Vocational Education

THE FOCUS OF VOLUME 2



Volume 2 concentrates upon the initial steps of how to inventory the tasks performed by workers in an occupation. This volume is intended to convey procedures and guidelines for developing comprehensive lists of task statements pertaining to the work done in a particular occupation, function, or cluster of related occupations. The completed list is to be ready for use in occupational surveys of task performance. Though directed primarily toward occupational work activity, the general process would seem equally useful for describing the performance content of any definable performance situation, whether it be an occupation or other life activity area for which individuals might be prepared to act effectively.

There are three major activities to follow in developing task lists. First, there is a need to define your occupational scope of interest, to establish boundaries on what should be of concern to you and to assure consideration of all features of the work situation that are important for your study. Second, persons attempting to state the tasks of a job need to acquire a thorough understanding of the nature of appropriate statements. Third, is the identification and stating of all work activities that potentially would be performed by workers within the intended and defined scope. This initial listing needs to be reviewed and edited to make the task statements complete, clearly understandable, and structured for later use in occupational survey questionnaires.

The procedural steps begin after a policy decision of what occupation or cluster of jobs is to be surveyed, or after the designation of a particular curriculum for which training content is to be established. Six procedural steps are described in this volume. These form a functional unit of the

total process that is likely to be accomplished by a single group of individuals in a prescribed period of time within an agency. Figure 1 depicts the sequences of these steps.

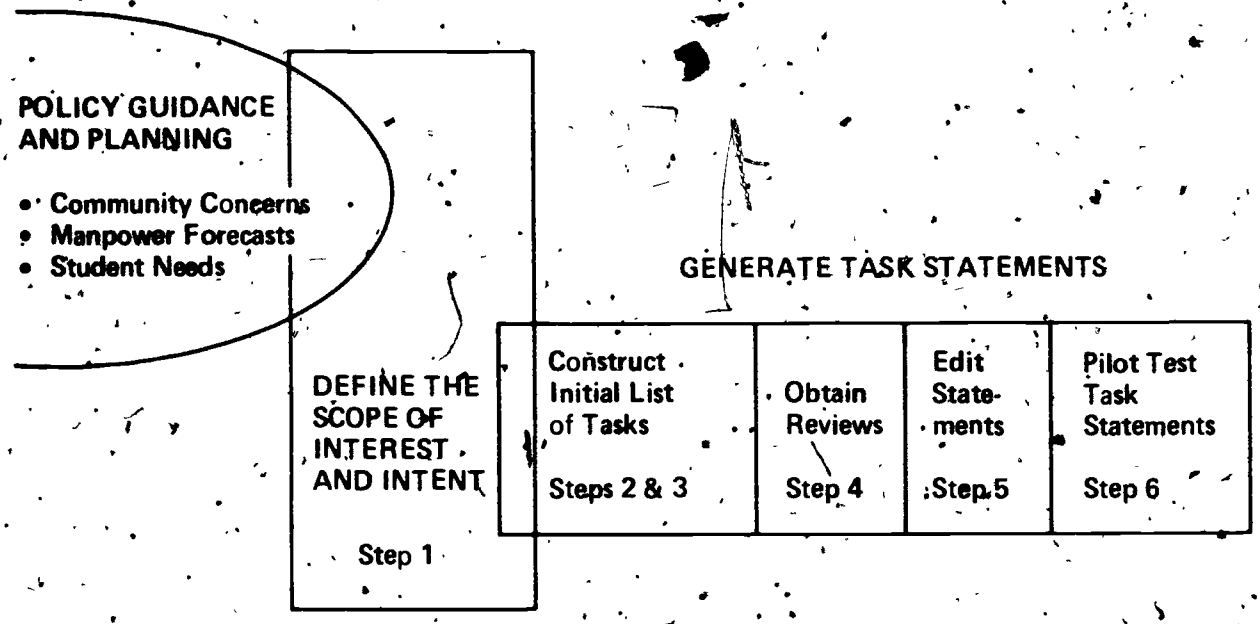


Figure 1. Procedural steps described in Volume 2.

Subsequent portions of the process could reasonably be accomplished by a different set of individuals or at a different time. They are, therefore, described in separate volumes of this series. In the next stages, reported in Volume 3, are procedures for validating these tasks as they pertain to each occupation defined as of interest. Volume 1 provides an overview of the complete process.

The issue of how to state the tasks of an occupation is a crucial one when the purpose of the study is to support decisions about what should be the specific job performance content of an instructional program for occupational preparation. Resultant occupational survey information must be sufficiently descriptive of occupational performance to enable decisions to be made about what particular work activity should be the focus of student learning experiences and achievement tests.

Research is still needed to firmly establish the influence of the form and specificity of task statements on the quality of task survey data. However, experience and exploratory research to date strongly suggest that careful attention is warranted on the matter of how worker activities are to be stated, particularly when these statements are to be useful in the process of making decisions about curriculum content.

It is logical that the decisions about training content would be more accurate and precise when the worker activity statements are clear and unambiguous. To do this, task statements often will require a level of detail and specificity beyond that needed for the more traditional uses of job descriptions.

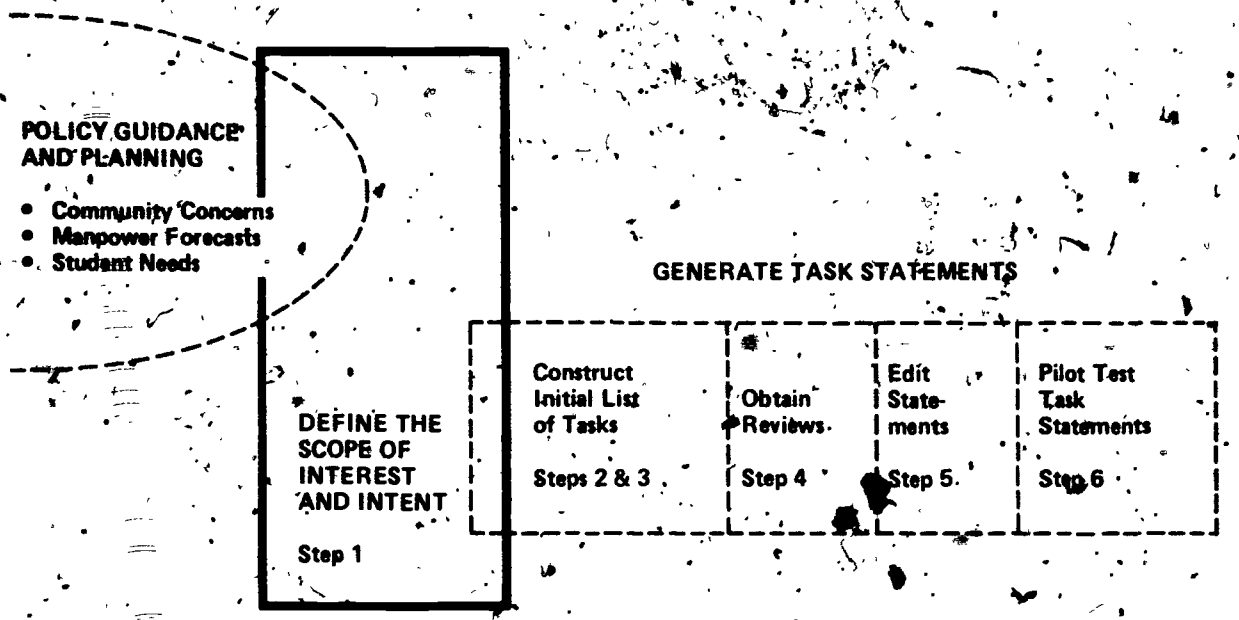
Broader statements of work activity lend themselves to more rapid answering of occupational survey questionnaires, and in many instances somewhat increase the reliability of ratings given to survey questions about each activity. But it seems self-defeating for training agencies to obtain such advantages at the sacrifice of the usefulness and value of the information for deriving appropriate curriculum content.

The procedures described in this volume are based upon the experiences and study of the task inventory survey process by many persons. The results have been synthesized to focus on the needs of curriculum developers who are concerned with the merit of the content of training programs. As additional experience is gained in applying these procedures for curriculums in a variety of occupations, it should be possible to continue to refine and improve the process.

This volume, and portions of Volume 3, represent an expansion of the guidelines reported in an earlier set of procedures on the construction and use of task inventories (Melching & Borcher, 1973). While a number of procedural revisions were made as a result of field tryouts of that report and of similar experiences reported by others working with task surveys, the Melching and Borcher report continues to provide an excellent and very useful introduction to the general methodology of task inventory surveys. It briefly translates the pioneering work of the U.S. Air Force into a form compatible for application in civilian contexts.

A task listing is not an end in itself. The list serves as a vehicle for obtaining data in a standard form on the relevancy and significance of each stated activity. These data in turn may be used to describe the work performed in an occupation or for subgroups of workers. They also may be used to aid in the identification of specific skills and knowledges required of workers in a particular occupation.

ACTIVITY A:
STARTING THE PROCESS



STEP 1: DEFINE THE OCCUPATIONAL SCOPE

At the outset it is necessary to decide on the breadth and scope of the work performance situation for which training is intended. The decision has obvious implications for the construction of a task inventory, the subsequent administration of occupational surveys, and the content of resultant training programs.

Defining the scope of interest is basically a policy decision, to be made by those in authority who direct that a training program or an occupational survey is to be accomplished. Typically, however, policy makers will not define precisely what is intended. Policy decisions are often based on broad issues, with considerable uncertainty regarding the particulars involved.

It generally falls upon those who have the assignment of carrying out policy decisions to specify and state the limits of the intended scope of interest, though such definition may subsequently be reviewed and approved by those in authority.

Some information already exists: authorities had some basis for making the policy decision in the first place. This may have included occupational manpower forecasts, employer suggestions, community interests, trends in curricular program offerings for the particular type of training institution, awareness of emerging needs, or any of a variety of other informational resources used by general program planners and policy boards.

From these beginnings the full definition of the occupational scope of interest is expanded and refined. "Defining the scope of interest" is not a complex or lengthy procedure; it is just a point of

applying plain common sense at the start of the process of identifying training content or of describing occupations. Thought and deliberate attention must be given to what are to be the boundaries and limits of the occupational domain that is to be studied. For example, will the scope be only one specific occupation, part of it, or a broader cluster of related occupations? Will it be for entry preparation, for advanced development of experienced workers, for worker retraining to related occupations, or for career advancement preparation? For a particular occupation, will it include the complete range of possible employment settings, or some restriction to a particular location, industry, or employing agency?

The sections below provide some guidelines for accomplishing the expansion and refinement of the scope definition, to clarify the intentions of the study that is to be conducted.

Defining the Intended Performance Situations

Three general ways exist for specifying the performance situations for which task lists can be compiled. The basic form is to list the tasks performed within a *single job classification* (for example, auto mechanics, medical secretaries, barbers, ranch hands, or catfish farmers). An expansion of this form is to list all tasks that occur within a particular *occupational area,* incorporating tasks of several job classifications within one list (for example, the occupational area of secretarial science might include the occupations of general secretaries, executive secretaries, medical secretaries, legal secretaries, administrative assistants, secretarial stenographers, clerk-typists, and others). A common variation of this multi-job form is to list tasks of each job occurring over a sequential progression of jobs up a career ladder, beginning with a typical entry occupation for which formal training is appropriate. A third form is to list tasks within a *single work function* cutting across several jobs in an occupational area (for example, purchasing tasks, sales tasks, supervisory tasks, or merchandise displaying tasks—of the retail trade store occupational area).

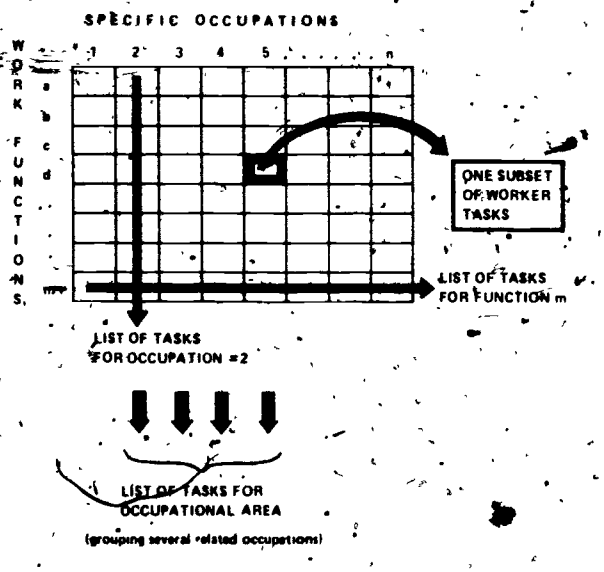


Figure 2. Ways of specifying work performance situations for task lists.

The three general ways of specifying work performance situations can be viewed as different ways of aggregating relevant tasks. Thus, as can be noted in Figure 2, the list of tasks for one occupation includes all functional subsets of worker tasks (shown as a single vertical column of the figure). The list of tasks for an entire occupational area (or career ladder) includes all subsets of tasks from a composite of several vertical columns (that is, from all occupations that make up the occupational area). All subsets of tasks within a single horizontal row of the figure provide a list that represents the activities of one work function that is a part of several different occupations. An occupational survey can be conducted with any one of these three types of task listings, depending on the intent of the policy decision.

If the range of occupations initially defined is unnecessarily large, the effort of compiling appropriate task lists and of conducting occupational surveys necessary to validate them (per Volume 3) becomes unduly lengthy and costly, and will result in a confusion of tasks not relevant to the intended area of interest. Conversely, however, if the range of work performance is defined too narrowly, the scope of the resulting lists of tasks may be undesirably or prematurely restricted.

Narrative Description of Each Occupation

A narrative paragraph description should be prepared for each occupation to be represented.

In the simplest instance, that of a single occupation that has been around for some time, it is often possible to obtain a description directly from the *Dictionary of Occupational Titles* (U.S. Department of Labor, 1965a). The narrative paragraph should include (a) the occupational title used by the Dictionary, (b) the nine-digit code identifying that occupation, (c) other titles commonly given to workers in that occupation, (d) statements of the general nature of the work performed, and (e) any closely related work or occupations that specifically are not intended to be part of the study. An illustration for the occupation of Automotive Mechanic is provided on the next page.

Two publications are needed to identify the nine-digit DOT code of a single occupation. The first six numbers of the occupational code are cited in Volume I of the Dictionary (U.S. Department of Labor, 1965a).[1] These six numbers represent a classification of job and worker characteristics. Several occupations can have identical six-digit codes. The last three digits, to uniquely identify a particular occupation, are cited in a subsequent publication of suffix codes (U.S. Department of Labor, 1967). This later publication, however, does not add any additional job description information.

The purpose of identifying this occupational code is to enable other persons who may be familiar with the use of the Department of Labor system to accurately know what occupation is involved. It is to be recognized, however, that most of the technical literature will not cite such a specific occupational identification, nor are workers and their immediate supervisors likely to be aware of this coding system.

A third publication, Volume II of the Dictionary (U.S. Department of Labor, 1965b), is useful in determining what occupations tend to be related, either by the U.S. Department of Labor's occupational groupings or by comparable worker trait requirements or by industry in which the occupation occurs. These listings can be scanned and compared with descriptions in Volume I of the Dictionary to help determine which are to be deliberately included or excluded in the occupational survey.

The narrative statement of the general nature of work performed can generally be prepared by synthesizing and summarizing information from a variety of available reference sources. These sources may include Volume I of the Dictionary, as well as job manuals, trade and professional literature, training materials and textbooks, and other publications noted later in this volume. The narrative statement should then be reviewed for accuracy by a few persons who are reasonably knowledgeable of the job.

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[1] The 1965 edition of the *Dictionary of Occupational Titles* (DOT) and its associated publications are cited here. The reader should be alert, however, for the 1976 edition which will supersede these. The 1976 edition was not released at the time this volume was prepared.

EXAMPLE

Scope of the Occupation of Interest

Automotive Mechanic (DOT No. 620.281-014)

In general, the Automotive Mechanic is one who repairs and overhauls automobiles, light busses, light trucks, and other automotive vehicles. They may diagnose damage or malfunctions, remove and replace units, disassemble and inspect parts for wear or servicing, overhaul units, rebuild parts, rewire electrical systems, reline or adjust units. They do *not* typically mend damaged body and fenders, *nor* install or repair accessories such as radios. They may become a specialist in one area of automobile repair, such as transmissions or engines, but must possess general skills listed above. Though not primarily assigned as supervisors, they may on occasion inspect and drive vehicles to verify repairs, schedule transporting of materials to service or storage areas, study repair schedules and estimate time/cost requirements, and similar supervisory activities.

Automotive Mechanics may be identified by such other job titles as:

a. Auto Mechanic
b. Automobile Repairman
c. Garage Mechanic
d. Engine-Repair Mechanic

Job assignments may be limited to particular repair functions, including such specialist or job titles as:

a. Differential Repairman
b. Drive-Shaft-and-Steering Post Repairman
c. Front-End Man
d. Brake Mechanic
e. Carburetor Mechanic
f. Tune-up Man

The scope of work performance interest does *not* include tasks of workers who are:

a. Less than full-fledged mechanics, such as:
   1. Automotive-Mechanic Apprentice
   2. Automotive-Repair Helper
   3. Automotive Repair Assistant
   4. Mechanic Helper

b. Specializing in non-automotive or peripheral systems, such as:
   1. Industrial Truck Mechanic
   2. Diesel-Engine Mechanic
   3. Farm Equipment Mechanic
   4. Motorcycle Repairman

c. Limited in *qualification* to one specialty area of automotive repair, such as:
   1. Automobile Body Repairman
   2. Electrical Systems Mechanic
   3. Service Station Mechanic
   4. Air-Conditioning Mechanic
   5. Automobile Painter
   6. Auto Mechanics Instructors

d. Supervisors of Automotive Mechanics, such as:
   1. Service Manager
   2. Garage Foreman
   3. Chief Mechanic
   4. Automotive Section Chief

It may help to define the scope of interest in some cases by stating also what work is not included, particularly if there may be cause for uncertainty because of closely related kinds of work. Since a number of experienced workers in most any occupation also tend to perform some tasks of the next higher job in their area, there may also be mention of some of the likely functions of such other jobs.

More typically a request for a curriculum content study or for an occupational survey will not precisely state an occupation that is defined in the *Dictionary of Occupational Titles*. The form of a policy directive often will be phrased in less specific occupational terms. This might be represented by occupational training or survey requests for such matters as:

1. Sub-professional jobs in the electric power industry.
2. Highway traffic safety functions.
3. Electro-mechanical occupations.
4. Social caseworker career ladder.
5. Specialists in environmental health.
6. Child care assistants, as authorized by recent federal legislation creating child care centers.
7. Use of basic hand tools by severely handicapped persons.
8. Entry jobs in the local food service industry.
9. Fire fighting technicians.
10. Police relations with local school staff.

Some of these requests pertain to new and emerging occupations, not well described in any existing reference source. Others pertain to worker functions cutting across several jobs in an occupational or an industry cluster of work, to relatively broad occupational areas, or to presumed sequences of career progression in a particular career area. Such types of requests require considerably more examination and resolution of the scope of interest than will precisely stated single occupations. However, a basic assumption of the procedures described herein is that workers exist and can be identified in the area of occupational interest. The procedures do not provide for the identification of tasks for hypothetical work not yet underway. For most public-supported education and training purposes this assumption seems appropriate since training typically would not be offered for work that is so new that meaningful employment opportunities do not yet exist.

In general, the usual request will indicate (a) the type of work intended, (b) the distribution of employment opportunities expected, and (c) the employment setting planned. Each of these may be roughly characterized to consist of three different options:

Type of Work

1. Single Occupation, All Functions.
2. Related Occupations (occupational area or career ladder).
3. Single Function, Across Several Related Occupations.

Distribution of Employment Opportunities

1. Nationwide.
2. Geographic Region.
3. Immediate Employment Area or Community.

Employment Setting

1. All Applicable Industries.
2. Single Industry.
3. Single Organization.

Except in special circumstances that direct a narrowed focus on some limited area or site of potential employment, it generally is recommended that a broad range of employment opportunities and settings be adopted. Such expanded scope of occupational relevance is more likely to be responsive to the career needs of the student population over time, by encouraging the development of training programs that accommodate a wide array of options for employment. With an increasingly mobile population, it does not seem in the students' best interests to limit skill development to the immediate needs of a state or community. However, any special interests or requirements of a local area should certainly be added to the defined scope of interest if they are not fully represented within broader scopes. Thus, if a particular industry is the obvious major employer of trained graduates, then any work requirements unique to that industry can be included, even though such requirements are not present elsewhere in other work settings for that occupation.

For functional groupings of jobs (such as retail sales), and for many of the subprofessional and technician jobs, a useful aid is Volume II of the *Dictionary of Occupational Titles* (U.S. Department of Labor, 1965b). Volume II of the Dictionary groups jobs in a variety of ways, "according to a combination of work field, purpose, material, product, subject matter, service, generic term, and/or industry." These groupings are reflected in the first three digits of the DOT code. By locating several occupations that are closely related to the functions or occupations of interest, it is usually possible to piece together a reasonably effective general definition of the likely domain of work activity.

For recently changing occupations, for career progression ladders, as well as for new subprofessional and technician jobs, a frequently useful reference source is the current edition of the *Occupational Outlook Handbook* (U.S. Department of Labor, 1976) and its companion periodical, the *Occupational Outlook Quarterly*.

Further elaboration and refinement of the occupational definition can be accomplished by contacting related professional associations, labor unions, state employment services, U.S. Department of Labor occupational analysis field centers, various special interest groups, and firms employing that type of worker.

Special Concerns

The three characteristic features of typical requests for a study [(a) type of work, (b) distribution of employment opportunities, and (c) employment setting] are probably the primary points that need attention in defining the scope of occupational interest. However, there are also a number of special issues that may warrant attention in some instances. Not all of these special issues are important in every definition of the scope of interest, but should serve as a checklist of potential key matters to be scanned for reminders of possible special situations or significant features that warrant definitional attention.

To emphasize the checklist character of these special concerns, each is cited below in an annotated checklist form. In one case there are subcategories also cited as part of the checklist.

1. [ ] Job levels to be included or excluded.

   For instance, should the definition include only the basic occupation, or should tasks of assistants/helpers/deputies as well as supervisors/foremen be included?

2. [ ] Job roles to be included or excluded.

   Should only the traditional core technical types of job positions be included, or should a wide array of likely unique and special positions also be included? There may be merit in specifying the types of likely roles, functions, or special positions to be filled by workers in that occupation, or by graduates of the particular training program. For example, in the occupation of Automotive Mechanic, is it desired to include tasks of Service Station Mechanics, motor pool maintenance, servicing of newly unloaded imported vehicles at ports of debarkation, specialists on foreign automobiles, light truck maintenance, farm equipment repair, or specialists on certain auto subsystems? In the occupation of General Secretary, will it be desirable to include the complete range of tasks performed in one-secretary types of work situations, such as those in the office of an insurance agent at a small office location? Where the workers may at times be *self-employed*, such as a Barber or Plumber operating his own shop, should the study include the functions of record keeping, income reporting, investments, and shop upkeep? If answers to such questions are uncertain, then it is useful to include all such variations so that occupational survey data may be obtained to help resolve their training implications.

3. [ ] Job labels to be accepted or not accepted.

   Job titles are not used uniformly across all employing agencies. Some titles represent wage structures within a particular firm, others are more colloquial than formal labels, and some titles merely represent specialized immediate work assignments within the overall framework of the occupation. Some clarification of acceptable titles usually will be helpful in communicating units of work performance which should or should not be considered.

4. [x] Performance situations to be considered.

   The nature of the other-than-normal, but significant, employment settings need to be identified to assure representative coverage of tasks that may be unique to such settings. Performance settings and situations may be of several types:

   a. [ ] *Geographical factors*, such as influenced by coastal, inland, mountain, desert, cold weather, extreme heat and humidity, regional cultural characteristics, or urban/rural variations.

   b. [ ] *Social, political, civic, and agency interactions.* Some occupations have special circumstances that must be contended with by some workers. If there is uncertainty regarding the prevalence and training need for such interaction, then it would be useful to specify their potential relevance to the scope of the study and gather data to establish their degree of relevance and training need.

c. ☐ *Unusual contingency situations* of an emergency, unpredictable, or accidental nature. These place stress on performance capability, but workers may be expected to be prepared to perform effectively under such abnormal conditions. For instance, state highway patrolmen may need to perform under conditions of high-speed chase of vehicles, pilots may be expected to land an aircraft with malfunctioning instrument panels, craftsmen may need to work from incomplete designs, and managers may need to make timely decisions based upon incomplete information.

d. ☐ *Problem performance situations.* Specific problem situations are often a part of particular jobs. Likely problem situations to be encountered, and how to deal with them, should be expressed as part of the intended job content. This will help assure that the subsequent inventory of tasks will include an explanation of the associated job performance in terms of the tasks which comprise the worker activity under such situations. For example, equipment operation during partial malfunctioning of some subsystems of that equipment, performance under severe time constraints or during special missions to which the system may be subject, having to complete a task without all of the proper tools or away from the normal work location, difficult types of people to be dealt with in performing some work assignments, or significant variations in organizational and adminsitrative constraints.

5. ☐ Time frame for potential use of learning.

Differing proportions of students will likely encounter a need for learning the tasks of an occupation after completing an intended formal training program. Some may be expected to change to other related jobs within just a few years. Others may attend more advanced training programs after a period of job experience. For others, the initial training program may be the only formal training, such that some competencies may need to be learned for use in situations that are not likely to arise for many years after the training program. Should such diverse conditions apply to the particular occupation under study, it may be helpful to estimate the proportions of students within each such category of time in which the learning is to be used. This can help in locating the age or experience limits for workers who will subsequently be responding to occupational survey questionnaires (see Volume 3), as well as establish whether activities performed only by senior workers should be included in the listings of job tasks.

6. ☐ Equipment or material involved.

Special attention on what equipment or material is used, operated, or worked with may be warranted for some occupations. This may be necessary to assure tasks are identified for items that might otherwise be overlooked, or conversely to suggest that tasks are not of interest for other items. For example, in the occupational area of secretarial science, tasks associated with the use of manual typewriters may not be within the desired scope of interest, even though some workers still use them. On the other hand, tasks specific to new electronic work-processing systems may be of high interest, even though few workers currently may be working with such equipment.

Though not a part of the defined occupational scope of interest, another issue also is of special interest. It pertains to the *purpose* for which a task inventory and occupational survey is to be

prepared. In any given instance there may be two major distinctions in the level of specificity that is appropriate for the task statements of the inventory and survey. The appropriate level is dependent upon the purpose for which the statement will be used. Greatest specificity is needed for making decisions about the curriculum content of training programs. More general statements are suitable for purposes of occupational description. The present procedures concentrate upon information needed for deciding upon curriculum content. Volume I provides a discussion of the several purposes and uses of task inventories and surveys.

The next section of this volume discusses, under Activity B, the nature and characteristics of task statements, including the features of general and specific statements of work activity.

Summary of Matters of Concern
In Defining the Scope of Interest

1. Occupational identifiers (job titles, codes).
2. General nature of work performed.
3. Occupations not included.
4. Features of typical requests for a survey:
   a. Type of work.
   b. Distribution of employment opportunities.
   c. Employment setting.
5. Special concerns:
   a. Job levels.
   b. Job roles.
   c. Job labels.
   d. Performance situations.
      1) Geographical factors.
      2) Social-political, civic, and agency interactions.
      3) Unusual contingency situations.
      4) Problem performance situations.
6. Time frame for potential use of learning.
7. Equipment or material involved.
8. Purpose: Curriculum content decisions or occupational description.

ACTIVITY B: UNDERSTANDING THE NATURE OF TASK STATEMENTS

This activity pertains to the central concept of the process for surveying occupational performance: tasks. Tasks are the key building blocks used in the occupational survey procedure. It is necessary, therefore, to understand the full process from this conceptual viewpoint. Activity B serves to communicate the nature of this important concept.

Though not actually a procedural step in itself, Activity B is a necessary and continuing point of concern in surveying occupational tasks. Discussion of the nature of task statements is inserted at this point, after defining of the scope of interest in Step 1. The location of this section within this volume thus benefits from the considerations that were introduced in the Step 1 discussions of scope definitions. These prior considerations should be helpful in understanding why variations and detail in the stating of tasks are meaningful and necessary.

DEFINITION OF A TASK

A task is a meaningful unit of work activity, generally performed on the job by one worker within some limited period of time. It is a purposeful job-oriented activity of a worker.

Each task performed by workers in an occupation should be a logically differentiated segment of work activity. In content, a "task" is generally said to *describe* a job activity that is intermediate in specificity between a "function or responsibility" and a "procedural work step or action." It is a discrete *unit* of activity and represents a composite of methods, procedures, and techniques which commonly serve to accomplish one meaningful unit of work. Tasks involve worker interaction with such objects and elements as equipment, material, other people, animals, information, ideas, data, events, and conditions. In most instances the performance of a task by a worker has a reasonably definite beginning and end; the whole activity requiring a mixture of decisions, perceptions, and/or physical actions serving a useful job purpose or a particular work assignment.

For use in occupational surveys and to provide a basis for decisions on the curriculum content of training programs, statements of tasks should have a certain grammatical structure and conform to several characteristics. Brevity and clarity are the foremost considerations. Task statements also should conform grammatically, represent a specific unit of purposeful job activity, and use terminology that is generally current and meaningful to persons close to the occupation.

Some Things That Are *Not* Tasks

- Worker qualifications (such as intelligence, aptitude, knowledge, education, skill, training, and experience) are not tasks; nor are they any component of a task statement.
- Receiving of instruction for the purpose of initial or entry job training is not a task unless actual useful work is performed during the training (as occurs in formal apprenticeship training). Classroom instruction, self-instruction, laboratory or shop instruction, and the coaching a person receives for such training are not tasks of an occupation. On-the-job training, however, may include the performance of work tasks. The giving of instruction, when it is a part of a job assignment, *is* considered to be task activity. Similarly, continuation training that is a routine part of the job to maintain a particular skill (such as practice in the use of emergency equipment), *is* considered to be a task of the job.
- Job responsibilities, position assignments, and work goals are not tasks. Though a part of a total description of the work, they serve here as useful sources and justifications for tasks, but are not themselves stated as tasks.
- Responsibilities and functions of an agency, shop, team, or office are not tasks. Tasks are activities of people, not of organizations.

The sections below describe the structure and characteristics of task statements. These are followed by a section dealing with some of the problems encountered in stating tasks. The guidelines and directions provided in these sections are intended to assist the curriculum developer or content analyst in producing useful and effective task statements. These are not inviolate requirements for every statement, but do point the direction to pursue in writing statements most beneficial for making decisions about curriculum content.

STRUCTURE OF A TASK STATEMENT

Each statement of a task is composed of three basic elements:

1. A specific *action* verb, descriptive of what is done.
2. A brief identification of what is being acted upon; the *object* of the action verb.
3. Whatever *qualifying phrases* may be needed to clearly distinguish the task from related or similar activities, or to limit and define the scope of concern, or to communicate unambiguously what task it is.

Thus, task statements are simple declarative statements. They typically start with an action verb in the present tense, with the subject of the sentence understood to be "I" (so that the statement makes personal sense to a worker who may be asked about what he does on the job). The following are examples of task statements, with several showing the use of meaningful qualifiers:

Action +	*Object or Element Being Acted Upon* +	*Necessary Qualifier*
Compute	product moment correlations	on a desk calculator.
Counsel	staff personnel	on career advancement.
Replace	brake shoes.	
Submit	receiving reports	for new library books.
Type	legal affidavits.	

The essential characteristics of all task statements to be used in task inventory surveys are that they be *brief* and *clear*. They need to be brief to save reading time for workers or others who may be asked to respond on such surveys. Clarity is needed so that the statement has essentially the same meaning for anyone having a reasonable knowledge of the occupation, particularly for workers and supervisors who may be asked to use the statements in describing their job performance.

For their use in the process of making decisions about appropriate job content for occupational training, it is also necessary that task statements be specific and reflect only one meaningful unit of work activity. Where the use of the statement is not for making curriculum content decisions, but to aid in differentiating between related types or levels of workers in an occupational field, the somewhat broader statements of work activity may be adequate. Job content for use in identifying performance test items, as when validating the content of employment tests or of training achievement exams, require the same detail-level as needed for curriculum decisions.

These two key uses, for training (and test) content analyses and for job descriptions, tend to require similar characteristics of task statements. Only in their level of specificity and their capacity to convey more than a single unit of work activity do the characteristics of task statements differ as a function of their intended use. Such distinctions are noted below where they relate to particular guidelines for stating tasks. In neither instance are the performance standards to be specified. Though such standards may be useful in statements of learning or testing objectives, they are not a proper part of task statements which serve only to communicate the work activity of an occupation.

Each task statement should conform with the following guidelines:

1. **Grammatical conformity.** The task statement should begin with a present tense action verb, followed by the object of that action. With the subject "I" omitted, but understood, the task statement is a complete sentence. Any necessary modifiers and qualifying phrases become part of that sentence. Do not use an action stem as a heading for a list of objects, since subsequent analyses may need to report each activity separately. For example:

CORRECT	NOT
• Type cards, such as index cards, file cards, and "address finder" cards.	• Type such cards as the following: a. Index cards. b. File cards. c. "Address finder" cards.
• Adjust carburetor. • Adjust governor. • Adjust automatic choke.	• Adjust the following: a. Carburetor. b. Governor. c. Automatic choke.

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It is not necessary for the action verb to have an identical meaning in all tasks in which it is used, but only provide clarity of performance intended in the context of the task statement. Thus, no standard list of defined action verbs need be followed in constructing task statements.[2]

2. **Performance specificity.** A task statement tells *what* work is done, not *how* or *why* it is done. It represents a distinct piece of work done by a worker employed in a particular occupation. Several points need to be followed to assure that a task is stated at a useful level of work specificity:

   a. Avoid activities that are obviously too specific or trivial. For example, "Place long distance telephone calls" is acceptable, but *NOT* "Dial operator," "Look up phone number in directory," nor "Ask for party being called."

   b. Avoid activities that are too general. Task statements should be able to bring out responses on occupational surveys that differentiate between:

      1) *Different levels of workers in a career ladder* (for example, between apprentices and journeymen and technical supervisors, between supervisors and managers, or between other skill level groups that are typical of the occupation).

      Thus, a skilled worker may perform an operational check on a piece of equipment, whereas a supervisor may only observe that the results of the check are within prescribed tolerances. Two task statements would be needed in this instance, one for each type of activity.

      2) *Different job types within an occupational field* (for example, in the field of secretarial science, between General Secretary, Executive Secretary, Legal Secretary, Medical Secretary, Administrative Assistant, and Stenographer).

      Thus, statements like "Type legal leases" and "Type medical records of patients" would differentiate between the legal and medical job types in the secretarial field. "Type on printed forms" and "Type standardized formats" would not differentiate since members of both job types could say they perform these tasks, and require quite different training to do so.

      3) *Different occupational fields* (for example, between art and meteorology).

      Thus, "Interpret photographs" would be too general since both workers in art photography and those using pictures from weather satellites might reasonably say they perform the task.

   c. Avoid the use of vague or ambiguous words. Typical of vague or general action verbs are:

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[2] If standard action verbs are desired for use in computer printouts of task statements, this can be done later, after first stating the activity in terms most meaningful to workers in the occupation. This will permit the use of standard terms for analysis and reporting, but retain job specific language for communicating with workers and their supervisors.

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arrange for	coordinate	maintain	participate in
assist	establish	manage	perform
assure	implement	monitor	plan
conduct	initiate	operate	supervise
control	insure that	orient	use

In some instances, depending on the context of the occupation and on the clarifying phrases included in the task statement, these verbs may be adequate. More commonly, however, they indicate a lack of precision in stating what work activity is intended by the statement.

d. The task statement must be worded so that any of the task rating scales used (on occupational survey questionnaires, per Volumes 3 and 4) make good sense when applied to it. At a minimum, for use in making training content decisions, it must be reasonable for a worker to answer HOW OFTEN he performs the task as part of his job. This requirement eliminates skill, knowledge, and responsibility items that begin with such words as "Have responsibility for . . . ," "Know how to . . . ," "Understand . . . ," "Have knowledge of. . . ." Some of the vague terms noted above also fail to meet this requirement (especially "supervise" and "maintain"). Each task should have a reasonably clear beginning and ending, other than employment in the job position.

e. Where the object of an action is a paperwork form, indicate only the type of form acted upon, unless it is so standard that all workers in the occupation would use the same precise form. In this instance both the title of the form and its identifying number would be included. For example, ". . . job application forms," ". . . stock inventory forms," "federal withholding Wage and Tax Statements (W-2 forms)." If two specific forms of the same general type are used in the occupation, but their use warrants quite different training content, then each would need to be identified in a separate task statement to permit differing decisions to be made about the need for training.

f. In general, avoid multiple action verbs in a task statement, unless several actions are invariably performed together. For example, "Clean, gap, and test spark plugs" is appropriate, but *NOT* "Inspect and turn brake drums." In the latter case these may be two separate tasks, performed by different types of workers.

g. In general, avoid multiple objects acted upon, unless several objects or elements are invariably acted upon together by a worker, or the activity is sufficiently similar to require comparable training. For example, "Rebush king pins or link pins" and "Lubricate the front and rear suspension" are acceptable statements, but *NOT* "Adjust carburetors, brakes, and headlights." Multiple objects used to clarify or give examples of a type of object acted upon are acceptable. For example, "Type cards, such as index cards, file cards, and 'address finder' cards" and "Order typewriting supplies (e.g., erasers, carbon paper, ribbons)." Avoid any use of "and/or" and "etc." Thus, do *NOT* state "Order typing erasers, carbon paper, ribbons, etc."

h. In general, avoid joining more than one activity statement into a single task statement, unless this is a brief and clear way to state a single meaningful unit of work. Accordingly, "Replace belts and set tension" and "Clean engine parts and check for condition" are acceptable, but *NOT* "Make list of contents of office safe and keep it up-to-date."

i. Omit statements of larger activities or functions of which a task is a part. For example, "Repair fuel pumps" is preferable to "Repair fuel systems." Each task should be independent such that the activity does not overlap with nor is encompassed within a broader activity or function. As apparent in the example above, the level or size of the activity represented by a statement can often be judged in terms of its object, "fuel systems" versus "fuel pumps."

This concern for level of specificity should not be taken to extremes. No harm is done if the larger activities should be included; it is just wasteful of time and effort to do so. When it becomes too difficult or time consuming to sort out the large activities, include those on which decisions cannot readily be made. Subsequent reviews and editing may provide further clarification of specific activities, permitting broader activities to be eliminated. It should be remembered that level of specificity varies somewhat as a function of the occupation being described. For instance, "Clean up the work area" might be a specific task for a secretary or mechanic, but for janitors or clean-up personnel the activity might represent a much larger work function.

j. Each task statement must be capable of standing alone. A statement such as "Perform other types of equipment checks" is meaningful to a worker answering an occupational survey questionnaire if listed at the end of a series of "Perform . . . equipment check" tasks. However, later in analyses of the survey responses the tasks may not be listed and reported in the same order as they appeared on the survey questionnaire, such as when they are rank ordered on the basis of their importance to the job. Thus, reports of survey analyses may destory the original context in which a task was listed, and a statement like "Perform other types of equipment checks" cannot then be interpreted by another reader.

The importance of this requirement also is evident when tasks are to be grouped according to system duty areas (as is discussed more fully in a later section of these procedures). For instance, when an automotive repair duty relates to auto air conditioners, it would seem sufficient to state a task as "Service control cables and switches." But, for the statement to make sense when it later may have to stand separate from a duty category, it would be more meaningful if it had been stated as "Service air conditioner control cables and switches."

When listing tasks under duty areas there may be a tendency to repeat a task under more than one duty. This should be avoided. For example, in a list of programmer tasks, "Develop computer operating instructions" could reasonably be listed under a duty of "Supervising ADP equipment operations" as well as the duty of "Programming computers." Despite the apparent logic of the dual listing, a task should only be stated once in an inventory of tasks, whether for a single occupation or for an entire occupational area. This eliminates the appearance of repetition in occupational surveys, which tends to irritate survey respondents unnecessarily.

3. **Generally used terms.** Tasks should be stated using technical terminology that is consistent with current usage in the occupational area. Avoid overly technical jargon and obsolete terms, unless needed to communicate clearly with workers in the occupation.

Terms that pertain only to a particular organization or a local situation also should be avoided, since the task statements usually need to be meaningful to many persons over a wide range of employment settings. Statements should be generally applicable throughout an occupation, regardless of how particular job positions are structured. Thus, workers in large firms may be assigned to specialized functions, whereas in smaller agencies the workers may perform a wider array of tasks. Their work assignments would differ only in terms of which tasks were relevant to each worker.

Use of abbreviations. Abbreviations must be used cautiously since they may not be understood by all workers throughout an occupation. They also can cause possible misunderstanding on the part of curriculum developers, teachers, and students who may seek to use the statements and accompanying survey data. Abbreviations may be desired to aid clarity, such as when some workers may more readily understand the abbreviation than the technical term. When this is the case it is good practice to spell out that term and follow it by the abbreviation in parenthesis. This abbreviation should be repeated each time the term is used in a task statement. Then, when the original context of a task listing is altered later for various reporting purposes, the item can still be interpreted.

4. **Job-oriented activity.** In stating job activities a distinction often can be made between *what the worker does* and *what gets done.* Descriptions of what the worker does are called "worker-oriented" statements. Descriptions of what gets done by a worker are called "job-oriented" statements. For the most part, *tasks should be "job-oriented."* Because of the brevity with which they typically can be stated, they serve to shorten the reading time of persons answering occupational survey questionnaires.

EXAMPLES OF JOB-ORIENTED STATEMENTS

- Lubricate wheel bearings.
- Overhaul engines.
- Detect product irregularities.
- Confirm reservations.
- Determine credit rating.
- Unload supplies.
- Clear land for construction.
- Refinish furniture.

An example of the differences in the two types of activity statements can be illustrated by the statement "Process order forms." The *processing* of forms is what a worker gets done. What the worker does may consist of (a) *reading* the forms to highlight certain information contained in them, (b) *reviewing* them for accuracy or completeness, (c) *comparing* information on the forms against standardized guidelines, or (d) any of several other actions. These worker-oriented activities may all be performed by the same worker, or they might be performed by different persons. Worker-oriented statements describe work activity in terms of what actions workers are performing, tending to indicate *how* a task gets done.

In many instances the statement of a job-oriented task, through a reader's familiarity with the action, will readily imply a well-defined notion of what the worker is actually doing. This should be a reasonable expectation for workers in that occupation, their supervisors, and for instructors providing training in that work. Job-oriented tasks thus directly imply worker activity. They do not state what a machine or system does, but what gets done to that machine or system. If the worker only presses a button to activate a machine, then "Activate" would be the action verb of the task statement.

Job-Oriented Examples:	*Implied Worker-Oriented Activities:*
• Type business letters.	(where the worker is *operating* a typewriter)
• Tune television receivers.	(where the worker is *manipulating* controls and antennas to adjust them for receipt of signals)
• Proofread manuscripts.	(where the worker is *reading* text for grammatical and spelling errors, and *writing* corrections for errors found)

This inferring of worker actions from job-oriented statements requires reasonable certainty that the worker action is fairly well known to the intended readers. An example reported by Gordon and McCormick (1962, 1963) where the worker action might seem obvious is the task, "Label each product submitted." In this instance we know that the worker is attaching some type of identification to an article, but there is no certainty of what actions the worker is performing. The worker may be pasting labels on a box, operating a machine, or even dreaming up names for new kinds of toothpaste. While tasks may appear to express a specific work activity, interpretation can be overly dependent upon the context in which the statement is used. Clarifying phrases should be added to job-oriented tasks to aid in effective communication of the intended activity, thus assuring that appropriate training can be identified.

The distinction between job- and worker-oriented actions should not be emphasized too rigidly, but be of general guidance in stating job-oriented worker activities. The distinction is a conceptually complex one, and not readily applied in all instances. Lack of consistent distinctions does not seem to alter drastically the usefulness of the activity statements.

SOME PROBLEMS IN STATING TASKS

For the most part, stating tasks is a reasonably straightforward process. However, occupations differ widely. Some are highly routine, characterized by a few obvious tasks performed in a prescribed manner by all workers in that occupation. Others are very non-routine, with individual workers performing only some segments of the total set of tasks relevant to the whole occupation. Some occupations are in a high state of change, due to new technologies or to emerging suboccupations or paraprofessional occupations. Some occupations, such as equipment operators and repairmen, primarily tend to perform physical activities which can be readily observed and described. Whereas, people such as teachers, managers, politicians, writers, scientists, and sales engineers often concentrate upon conceptual and cognitive types of work activity. These and other job variations can create a number of problems in stating tasks.

The sections below attempt to provide guidance in handling these problems as they may arise in a particular effort to state the tasks of an occupation. Reference can be made to particular sections as the need arises.

1. **Use of statement qualifiers.** Simple task statements should be used without qualifiers, unless the qualifier is essential to the meaning of the statement. For example, "Compute sales tax" is preferable to "Compute sales tax to determine amount of tax on sales." Conversely, "Schedule employees for on-the-job training" is preferable to "Schedule employees."

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Several conditions may necessitate the use of qualifying phrases. These are governed by the general rule of doing what is necessary to be able to make specific decisions about training needs. Thus, if significantly different training activities and learning could be implied by a brief task statement, then qualifying phrases would be needed to clarify the actual task intended. The objective is to avoid confusion with similar activities that may have different training needs. This may require that each distinction form the basis for a separate task statement.

In general, there are four different types of task modifiers:

a. *When there are multiple ways of doing a task,* there may be a need to state *how* (which way) it is done. For example, the activity of computing grade-point averages for students might be stated in one or all of the following ways, each involving quite different training content:

- Calculate student grade-point averages by hand.
- Calculate student grade-point averages using a small electronic calculator.
- Calculate student grade-point averages using a desk-top programmable computer.
- Calculate student grade-point averages using remote input/output terminal to large central computer.

Stating the means or media used in performance can sometimes be accomplished by modifiers of the action verb, as in "Visually inspect . . . ," "Road test . . . ," "Spot check. . . ."

Another example is cited by Mayo (1969), in which a lineman on a telephone cable installation crew may "Dig cable trenches." However, this task could be accomplished either with hand tools or with trenching machinery. Not all workers in the occupation would have access to trenching machinery, so two distinct task statements are necessary to yield survey information by which each approach can be assessed for its training implications.

In contrast, again using an example cited by Mayo (1969), the methods of performing some tasks are so variable that a general format is more appropriate. Thus, "Coordinate with supply department to resolve supply problems" is a more economical construction of an activity statement than would be a series of specific task statements depicting each type of problem and each method used to solve the problem.

> Caution must be used in assuming that only prescribed methods are used by workers.

Sometimes common practice will deviate from authorized procedures, and do so in a manner that warrants consideration in training. For example, in the business of packing critical items for storage or shipment, there may be a dozen or more

authorized packaging procedures. Each might be cited in task statements. But, in probing to generate and review a list of tasks for that occupation, it might be learned that the prevailing practice is that workers seldom package strictly by any of the authorized procedures because the necessary tools, material, or test instruments are not generally available. Instead, the workers actually may perform an additional form of packaging, that of "improvising" based on resources available. If this were also listed in an occupational survey, it could be learned to what extent it prevailed over the other methods and decisions could then be made regarding the merit of teaching how to improvise in packaging.

b. *When there are multiple purposes for a task,* there may be a need to state *why* it is done. For example, the activity of checking the condition of on-site power generators might be stated in the following ways, each involving quite different and separate performance on the job:

- Check generator for evidence of overheating.
- Check generator for adequacy of oil level.
- Check generator for evidence of physical damage.
- Check generator for adequacy of exterior paint.

Each of these checks may be performed with a different frequency, and be of differing job importance and concern for formal school training.

If a name is commonly used to identify a prescribed procedure, that name may be used without stating the precise action or concern of the task. For example, "Perform cylinder leakage test," "Pressure test the air conditioner system," and "Perform preventive maintenance inspection of common hand tools." If, however, a worker does not perform the test procedure itself but does monitor the test results, a task should be stated for such monitoring action. For example, "Observe oscilloscope for results of calibration check" and "Receive reports on, and compute the results of, the testing of revised computer programs."

A problem can occur in focusing upon the purpose of an activity. It is a problem that was first pointed out by Fruchter, Morin, and Archer (1963). They noted that a statement like "Calculate correlation coefficients for factor analyses" reflects a purpose, and that there could readily be a variety of such purposes for which correlation coefficients could be calculated. Where the worker activity is essentially the same irrespective of the purpose for which it is performed, they recommended against the use of such qualifiers of the task statement. The qualifier should be added to the basic task statement only if the purpose reflects a different activity than when some other purpose is associated with that basic task.

In instances where the purpose qualifier is useful, then at least one other task also needs to be stated, to reflect the alternate activities associated with other purposes.

c. *When there are multiple situations and conditions under which a task is performed,* there may be a need to state *where* or *when* it is done. Such situations and conditions may be due to geographic differences, environmental conditions, employer size,

organizational climate, anticipated equipment malfunctions, potential errors in human performance, time pressures or other stress factors, and emergency operating contingencies. These contexts or task conditions, if they are suspected to be important factors in the determination of job-relevant performance requirements, need to become part of separate task statements.

Some tasks can be of considerable difference in training importance and content because of such situations and conditions. For instance, "Remove and replace wheels" may require quite different training for performance as emergency road service at night on busy urban highways, as opposed to performance within a service garage. Similarly, corrosion prevention tasks might differ near the salt spray of sea coasts, as opposed to the southcentral part of the country. Winterizing a car may differ for workers high in the Rocky Mountains, as compared to those working in Virginia. And, performance under threatening conditions or during equipment failures may warrant specialized training, such as landing a plane when a tire blows out on touchdown, or driving a vehicle in heavy fog.

Some occupations may be more sensitive to such variations than others. Thus, police officers and firemen may have many performance contingencies, whereas clerical personnel and assembly-line workers may have relatively fewer of such critical, nonroutine performance conditions.

d. *When the range of what is to be acted upon is restricted,* there may be a need to state the *scope* of the performance or problem situation. For example, "Counsel staff personnel on career advancement within the employing agency" places limits on the counseling of staff personnel. If other counseling activities occur, they would be stated as separate tasks.

Defining of the task limits aids curriculum developers and training instructors in knowing the boundaries and extent of the necessary learning content. Limiting the scope of the object acted upon can in some instances be accomplished by the addition of descriptive adjectives to the class of objects or elements acted upon. In the following examples the italicized portion helps to clarify the object of the action:

- Proofread *final research* reports. . . .
- Review *recently published experimental* literature. . . .
- Administer *brief job satisfaction* questionnaires. . . .
- Lecture *large groups of adult* students. . . .

If a modifier is needed for greater task specificity or to distinguish between similar activities, all other significant tasks with comparable modifiers should be listed. For example, in a listing of automotive mechanic tasks, "Repair transmissions" would not be specific enough. Therefore, if the statement were modified to read "Repair automatic transmissions," then "Repair standard transmissions" should also be included in the list of tasks.

Always avoid redundant qualifying phrases such as "when appropriate," "as required," "in accordance with prescribed directives." These are often found in source materials, but serve no useful purpose in task inventories.

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2. **Treatment of fringe activities.** Many individual job positions include some work assignments which do not necessarily relate directly to the occupation being described. They may be minor or occasional activities which form a part of the general employment situation, such as occasionally delivering some material to a destination at the supervisor's request, or helping out for a day in another department. At other times there may be fairly definite assignments of additional duties, such as serving as a supervisor during temporary absences of the boss, serving as shop steward for the union local, serving as the office chairman of a charity drive, serve as a member of a committee or board.

Each of these peripheral activities are on the fringe of the basic occupational definition. Yet for workers in the occupation, such activities may represent very real requirements of their job, individually or as a composite of activities. As such, they may warrant training consideration. Thus, they do need to be included in the inventory of potential tasks for the particular occupation. Arguing against inclusion, however, is the likelihood that there may be a great many different and often trivial tasks that could be stated, if they were all stated at a very specific level of performance activity.

Resolution of this issue can be achieved by listing general statements of fringe activities.

> Activities which are central to the occupation should be handled with statements of greater specificity than activities which are on the fringe or periphery, but both are to be represented by task statements.

Instead of listing all the specific tasks of a peripheral function or of no immediate interest, the overall function can be stated as one general task. For instance, if a secretary is also qualified and serving as a notary public on occasion, a statement could be listed as "Serve as notary public." It would be unnecessary to list all tasks of notary publics. Such a general statement retains the general activity in the listing of tasks for the complete scope of the occupation, permitting data to be gathered later in occupational surveys for the purpose of assessing its actual significance to the occupation. Should it later be found to be of importance for occupational training, it may subsequently be subjected to a more detailed analysis.

This process helps shorten the work of generating task lists without completely omitting the fringe activities on the basis of preconceived ideas of what is a significant part of the job. For occupations undergoing change, or which tend to vary across different employment situations, subjective decisions not based on field data can be very erroneous and misleading.

Another type of what might be considered "fringe activities" are the tasks which deal with the common and routine parts of a job that tend to get overlooked in discussions of what work is performed. These activities often pertain to:

1. Work with or on peripheral objects and equipment.
2. Ordinary equipment operating discrepancies.
3. Occasional interactions with clients or other persons.

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These activities can in fact be very important and vital to the operation, and need to be listed for training consideration. For example, in the work of automotive mechanics there is a need for tasks concerned with the conditions and effects of wind, water leak, noise, vibration, and harshness. Similarly, tasks should be stated for the functions of hydraulic lift operation, safety in the shop, acetylene and arc welding, maintenance of shop equipment, and task use of air operated tools (drills, impact tools, jacks, etc.). And, there could be mention of action regarding time cards, clocks, or records of work orders; as well as actions in relating to customers and to members of the local community.

While such work may not represent the core technical characteristics of the occupation, it does potentially constitute elements of the job and employment situation that properly may be of concern for training programs intended to prepare students for successful employment in the occupation.

Another variation to be considered is when a significant proportion of workers in an occupation also tend to perform in a secondary occupation. For example, a good many barbers also perform a number of the tasks of a shopkeeper. This may include clerical and bookkeeping tasks, as well as the management of a small or part-time staff. These secondary aspects of an occupation should not be ignored when compiling the initial list of tasks.

3. **Treatment of a task of immense importance.** In some occupations there may be one or two tasks which are of quite considerable importance for most workers. Typically, such tasks are complex and entail a variety of conditions and situations under which they are to be performed, or for which ability to perform is expected of a worker. These are obviously of considerable training interest.

To gain additional useful information about the task by means of occupational surveys, a very critical task can be broken up into a number of more specific activity statements. Often this can be accomplished by the adding of qualifiers to a basic task statement. Additionally, more specific tasks might particularly concentrate upon the performance conditions, information-gathering actions, decisions to be made, or actions to control various events which represent key competencies within the total task.

For example, the bookkeeping task of "Prepare payroll register," if especially important for differential curriculum decisions, might be divided up into the following activity statements:

- Determine if all employees are listed on the payroll register for a particular payroll period.
- Transfer exemption information from payroll records to payroll register.
- Verify time cards.
- Compute employee gross earnings, necessary deductions, and net earnings.
- Compare dollar amounts and total hours to previous payroll periods for reasonableness.
- Determine if all gross earnings, deductions, and net earnings computed on the payroll register are correct.

- Report apparent discrepancies in payroll register computations.
- Post from payroll register to employee earning records.

Grouping these activities within the same duty category (in Step 4) will help retain the payroll context function under which they have meaning on the job. Whether some of these are performed manually, or with the aid of desktop machines or computers can be identified subsequently by noting the types of equipment operated (see section 5 below, on equipment and job aids).

4. **Treatment of training which constitutes a routine and expected part of the job.** Certain occupations contain elements of on-the-job training activities to develop and maintain skills for important and anticipated, but rarely performed, tasks of the job. This is especially evident in occupations dealing with emergency or hazardous situations. For example, policemen receive continuation training in unarmed combat and practice in the use of firearms. Firemen and others routinely receive training in emergency first aid procedures. Medical doctors and others are expected to attend skill up-dating training programs. And, such occupations as radio operators and air traffic controllers may need to maintain skills for periodic government licensing examinations.

   These kinds of learning activities should be stated as tasks when they form an integral part of the job. They may include classroom training, as well as participation in full-scale simulation exercises for operating units.

   To decide whether a learning activity should be stated as a job task, follow the rule of the Internal Revenue Service: If it is needed or required for maintaining employment in the occupation, it is appropriate, but not if it serves primarily to qualify the worker for a new occupation or for job advancement.

5. **Operation of equipment and use of job aids.** Training for an occupation traditionally may be concerned with the development of skills in the operation of equipment or in the use of tools and other things that assist the worker in doing tasks more effectively or efficiently.

   Job aids can consist of such items as special tools, charts, test instruments, checklists, reference guides, templates, procedural manuals, maps, forms, wiring diagrams, hand calculators, style guides, or other such devices and memory aids that support task performance. Their use, in and of themselves, is *not* a task activity. While there may be an urge to state these as tasks (e.g., "Operate keypunch machine," "Use reference book or manuals"), it is more useful to *list them separately.* It is only necessary then to state the item, omitting the action term of "operate" or "use."

   By this item listing, equipment and job aids can be included separately in occupational surveys (see Volume 3) if information is desired on the proportion of workers operating or using each, or on their level of significance in various occupational situations. However, only those items should be included in which there is a likely or potential interest for job description or for training purposes. The others can be omitted from the occupational survey questionnaire to minimize the time it takes a worker to answer the entire questionnaire.

   Incidentally, these item listings can be useful in the process of generating lists of tasks, to stimulate the ability of workers to recall their job tasks during interviews. Interviewers

can ask in what tasks each item is used. Other interviewing techniques are discussed in a later section on task review procedures.

6. **Use of technical concepts and techniques.** As with equipment and job aids, training in some occupations traditionally has been concerned with the acquisition of technical knowledge, not with job performance activities. Knowing and understanding certain key information, or particular technical concepts that have practical use in performing job tasks might involve such matters as: vocabulary and nomenclature, subject matter content, machine characteristics and specifications, organizational or system structure, advanced computational skills, operating principles and theories, rules and standards, or other such technical information.

   There can be strong pressure to include these technical concepts and techniques as task statements. For example, it would be possible to state these as follows:

   Improper Stating of Technical Knowledge as Tasks

   - Use simple business math.
   - Use probability theory to design data systems.
   - Perform analog programming.
   - Use linear programming techniques.

   Improper Stating of Techniques as Tasks

   - Vary classroom routine.
   - Maintain open door policy for employees.
   - Provide prompt feedback.
   - Demonstrate sensitivity to worker grievances.

   While it is recognized that such technical knowledge may be of training interest, by themselves they are not purposeful tasks of the job. They are the means by which one or more tasks are accomplished, and may be cited as modifiers to such tasks as necessary. They should not be listed separately in an occupational survey questionnaire, since they would add an undue bulk to those questionnaires.

   Where special information may additionally be desired about the job significance of these concepts and techniques, a second type of field survey can be generated to supplement the task-based occupational surveys. For this approach the reader is referred to a report authored by Ammerman, Essex, and Pratzner (1974) which is available from the ERIC Document Reproduction Services, or from The Center for Vocational Education. This process constitutes a separate analysis of the occupation, distinct from but complementing the procedures of the present manual.

7. **Describing supervisory and managerial jobs.** One of the more challenging efforts is to state the tasks performed by supervisory and managerial personnel in an occupational area. It is insufficient to say they "Supervise subordinate personnel," "Control flow of work," "Monitor safety programs," "Supervise training programs," "Analyze company operations," "Plan facility modification," "Approve expenditures of funds," or "Attend meetings."

   Several tasks need to be generated to describe what is being done in accomplishing each such general function. Thus, instead of saying "Hire new employees," it should be possible to identify such component tasks as:

- Process applications and other paperwork for employment.
- Screen applicants on the basis of standard test scores.
- Observe applicants performing sample portions of the job activities.
- Interview applicants.
- Authorize the hiring offer for applicants.
- Orient new employees to the firm.

Since a supervisory or managerial function may differ quite substantially in terms of level of responsibility and learning implications, it is helpful to distinguish between them at least to some moderate degree. The following examples, based on executive activities reported by Hemphill (1960), illustrate how these distinctions might be stated. The distinctions tend to be based on the amount or nature of the action.

- Dictate at least 25 letters per week.
  Dictate letters, but fewer than 25 per week.
- Initiate requisitions involving a gross item value of at least $5,000.
  Initiate requisitions involving a gross item value of less than $5,000.
- Sign documents that obligate the company to the extent of at least $1,000.
  Sign documents that obligate the company for less than $1,000.
- Approve requests for expenditures not covered in authorized budgets.
  Approve requests for expenditures that are covered in authorized budgets.
- Prepare contracts for approval by a superior.
  Prepare contracts not requiring approval by a superior.
- Approve exceptions to established credit policies.
  Request or recommend exceptions to established credit policies.
- Evaluate records of production of a work force of 100 or more employees.
  Evaluate records of production of a work force of 10 or more, but less than 100 employees
  Evaluate records of production of a work force of less than 10 employees.
- Forecast market trends of the very near future.
  Forecast market trends five to 10 years in the future.

Comparable distinctions also may be helpful when it is important to differentiate between similar jobs, such as between general machinist and precision machinist, or between boilermaker welder and pipe line welder on active ("hot") lines.

Berger (1974) cites an example in the computer programming field where the task "Code and debug modifications and corrections to systems software" was considered appropriate for systems programmers, but the statement did not clarify the sense of the task as performed by scientific and engineering programmers. For the latter group the task would better be stated as "Code and debug scientific and engineering program changes in higher level language such as FORTRAN or PL/1." For business programmers the task was stated as "Code and debug changes and corrections to business data processing programs."

Supervisory and managerial jobs, as well as those of some professional occupations, often will tend to use action verbs of a more mental than a physical nature. Thus, such jobs will more likely reflect such appropriate and relevant actions as:

Appraise	Contact	Forecast	Recommend
Approve	Counsel	Inform	Review
Assign	Decide	Interpret	Schedule
Chair	Determine	Investigate	Set
Check	Draft	Negotiate	Study
Compare	Estimate	Plan	Submit
Conduct	Explain	Process	Verify
			Visit

These reflect an emphasis upon information processing and communication functions, which are common features of many jobs not dealing with equipment operation or maintenance, or with direct service for a customer or client. It should be obvious from a number of these actions that tasks need not be limited to *observable* work performance, but often may identify job activities not readily discernible by a person other than the worker.

Additional suggestions for identifying and stating tasks of supervisors and managers are presented in the later section on techniques to probe for additional tasks during review sessions.

8. **Restrictions when using computer printout of task statements.** Some users of this manual may have the capacity to use a computer for printing task statements directly onto survey questionnaire forms or reports of data analyses. This capacity will place special restrictions upon how tasks should be stated, depending upon the characteristics of the computer program and equipment being used.

Typical of these program restrictions are such directives as the following, though a particular program may modify or add other limitations:

a. Task statements should be limited to 117 spaces and not more than two printout lines. Neither the first nor the second line may exceed 59 spaces. This will necessitate that some task statements be edited to shorten them by use of a more telegraphic style. In the context of an obvious computer printout, the sense of the abbreviated task statement should communicate adequately the intended activity. To further reduce space requirements, the period at the end of the task statement is omitted.

b. Some computer programs may handle only certain signs and symbols (e.g., plus, minus, diagonal, period, comma, parenthesis). Depending on the capacity of the program to be used, statements would be edited to eliminate the need for any nonalphanumeric signs beyond that program's capacity.

c. Computer programs usually print capital letters only. In such cases the task statements should be edited to avoid the use of words or abbreviations which require lower case letters. For example, if the abbreviation for Unsatisfactory Reports (URs) were used in a task, it would appear as *URS* in the printouts and might be confused with another abbreviation. However, URs would appear as *UR'S* in the printouts and would be acceptable.

The use of computer printouts of task statements most generally would occur when occupational surveys are to be conducted by an agency on a more or less routine or production basis, with periodic resurveys to update the job information. Where only a few one-time surveys are anticipated, the usefulness of placing task statements into the computer system would generally be greatly reduced.

RECOGNIZING FAULTY TASK STATEMENTS

Several kinds of errors commonly occur in the stating of tasks, particularly when they are to be used to obtain job performance information for subsequent decisions about training content. These problem areas need special attention to assure effective statements of each task of an occupation, consistent with their intended use in occupational surveys. The seven most common faults tend to be:

Types of Faulty Task Statements

1. More than one task in a single statement.
2. Activity is stated as a general function or responsibility.
3. Unclear statement of the action.
4. Overly dependent upon duty context for meaning.
5. Too many limits placed on how the task is performed.
6. Substitution of method of performance for the task itself.
7. Stating only the operation of equipment or use of an item.

Each of these typical faults is explained and illustrated on the pages which follow, using examples from three occupations: Automotive Mechanic, Business Data Programmer, and General Secretary. It is anticipated that these examples might be useful in training staffs to state tasks, to assess the merits of statements previously prepared and made available by other agencies, to review those prepared locally, or to use as standards against which to compare statements for possible faults.

Following these fault illustrations is a brief chart for assessing the adequacy of a sample of activity statements. The appropriate answer in regard to selected task characteristics is completed in the columns to the right of each statement.

FAULT: *More than one task in a single statement.*

Task statements including multiple job activities may make it impossible to determine which activity is associated with task survey data or is of training concern. They may also confuse survey respondents who would prefer to rate each activity differently, such as when one of the activities is performed by another type of worker or its job significance differs quite a bit from the other work cited in the statement.

Variations of this fault are.

1. Use of more than one action verb.
2. Use of more than one object acted upon.
3. Linkage of several tasks in one compound sentence.

EXAMPLES OF FAULT

More Than One Action Verb:

- Test and rewire electrical dash units.
- Inspect and replace defroster hose.
- Adjust, repair, or replace back-up light switches.
- Repair or replace wheel cylinder.
- Plan and conduct on-the-job training of data processing procedures.
- Review and prepare cost estimates of equipment use.
- Edit and review a report.
- Select or order furnishings for office.

More Than One Object Acted Upon:

- Repair ignition switch, resistor, wiring, coil points, and condenser of the primary circuit.
- Lubricate vehicles and equipment.
- Prepare cost report or cost estimate for data processing equipment.
- Prepare a briefing or visual presentation.
- Evaluate files, reports, or correspondence.
- Develop procedures for the maintenance of news files and reference libraries.

Separate Tasks Joined in One Sentence:

- Pressure test, performance test, and leak test the air conditioning system.
- Inspect vehicles and apply materials for corrosion and rust control.
- Analyze core dumps, evaluate, and recommend solutions.
- Plan programming work loads, make work assignments, and organize shifts.
- Perform system generation, establish source and relocatable library sizes, etc.
- Order all publications and keep track of subscriptions.
- Make list of contents of office safe and keep it up-to-date.

ACCEPTABLE USE OF SOME MULTIPLE ACTIONS AND OBJECTS

Composites of more than one action verb or object acted upon are acceptable and appropriate in a single task statement when they:

1. Tend to occur together as a whole unit of work.
2. Serve to clarify a single type of work activity, and reasonably involve the same training.

Examples of Acceptable Tasks:

- Clean, gap, and test spark plugs
- Locate and repair short in wiring.
- Clean engine parts and check for condition
- Lubricate front and rear suspension
- Replace hydraulic lines and fittings.
- Inspect drive shaft, U-joints, and center bearings
- Fold and insert letters in envelopes
- Inspect money orders and checks as to amount, dates, signatures
- Inspect material received for completeness and damages.
- Record time card or time clock data on payroll forms.
- Stuff, bundle, sort, and/or label outgoing mail.
- Address letters and packages.

FAULT: *Activity is stated as a general function or responsibility.*

Statements of general work functions or job responsibilities do not provide adequate specificity for use in making decisions about training content. They also confuse raters of task performance surveys because a variety of tasks enter into the accomplishment of the function or responsibility. Typically, such general activities are of an ongoing nature in a job assignment, with no definite ending or times of performance.

EXAMPLES OF FAULT

- Maintain washrack equipment.
- Train individuals on the job.
- Resolve technical problems.
- Monitor safety programs.
- Prepare forms and correspondence.
- Do preliminary work for income tax return.
- Supervise clerk typists.
- Control and manage filing system.
- Act as cashier or teller.
- Perform operator maintenance on ADP equipment.
- Identify problem areas in the system.
- Perform non-linear programming.
- Evaluate deviations from standards.
- Optimize program execution times.
- Supervise documentation of programs.
- Design operating systems.
- Coordinate scheduling of machine work load.
- Maintain current run tapes.

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FAULT: *Unclear statement of the action.*

General or vague action words for task statements do not allow the person providing task ratings to be certain of the intended meaning of the statement. Nor can the person interpreting the training implications of such ratings be certain of what work activity the rater had in mind. Occasionally it is possible to clarify a task by including its purpose or the method to be used.

EXAMPLES OF FAULT

- Inspect lubrication and service guide.
- Follow-up on requisitions.
- Perform road service.
- Check exhaust systems.
- Review records for compliance with labor laws.
- Inspect steering.
- Correct bearing fit.
- Coordinate with staff in the development of new systems.
- Extract figures needed for special analyses.
- Make switch settings.
- Exploit parallel processing capabilities.
- Develop subroutines.
- Trace mail.
- File materials.
- Extract information from files.
- Implement employer's directives.
- Help organize office or company committees.
- Make preparations for meetings.
- Keep card indexes.

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FAULT: *Overly dependent upon duty context for meaning.*

While brevity is desired in task statements, sufficient description of a task activity must be included to permit the task to be reasonably meaningful when not grouped with functionally related tasks. This might be necessary when subsequent analyses rank the tasks on some issue.

EXAMPLES OF FAULT

- Performance test the system.
- Complete unsatisfactory reports.
- Evaluate suggestions.
- Replace system regulators.
- Evaluate deviations from standards.
- Plan layout and makeup.
- Make out monthly statements.
- Diagnose malfunctions.

FAULT: *Too many limits placed on how the task is performed.*

Though task modifiers are sometimes useful to clarify the meaning of an activity statement, some modifiers may be unduly prescriptive and place too many unnecessary limits upon the intended performance statement.

Variations of this fault are:

1. Stating how often or when a task is to be performed.
2. Use of all-inclusive terms, such as "all," "every," "always."

EXAMPLES OF FAULT

Stating How Often or When:

- Change dates on time stamp machine or calendar daily.
- Prove cash daily.

Use of All-Inclusive Terms:

- Initiate all computer operating notes, technical bulletins, etc. for job performance improvements.
- Order all publications for library.

FAULT: *Substitution of method of performance for the task itself.*

Stating how a task is performed, with the actual task sometimes following as a modifier of the method, causes the emphasis to be misplaced. This can lead to undue attention upon the method instead of upon the work activity as the training objective. It also may cause uncertainty as to which part of the statement a survey respondent is attending. And, there may be a tendency to omit the task activity altogether, stating only the method of performance. The same problem occurs when the purpose of an activity is substituted for the task to be performed.

EXAMPLES OF FAULT

- Write shorthand.
- Work with operations supervisor to determine best operating procedures to be followed.
- Optimize program execution times.
- Resolve technical problems.
- Incorporate standard routines into programs.
- Use linear programming techniques.
- Control system input and output.
- Perform analog programming.

FAULT: *Stating only the operation of equipment or use of an item.*

While it is useful to know what equipment is operated or what special items are used by workers, these actions should not be stated by themselves as task statements. Various equipment and job items may be listed separately on a survey questionnaire, without any associated action verbs. Questions of use may then be asked of each, if desired, but as a separate and distinct information-seeking part of an occupational survey.

EXAMPLES OF FAULT

- Use proofreading symbols.
- Use directories.
- Use simple business math.
- Operate intercom.
- Operate keypunch machines.
- Operate copying machine.

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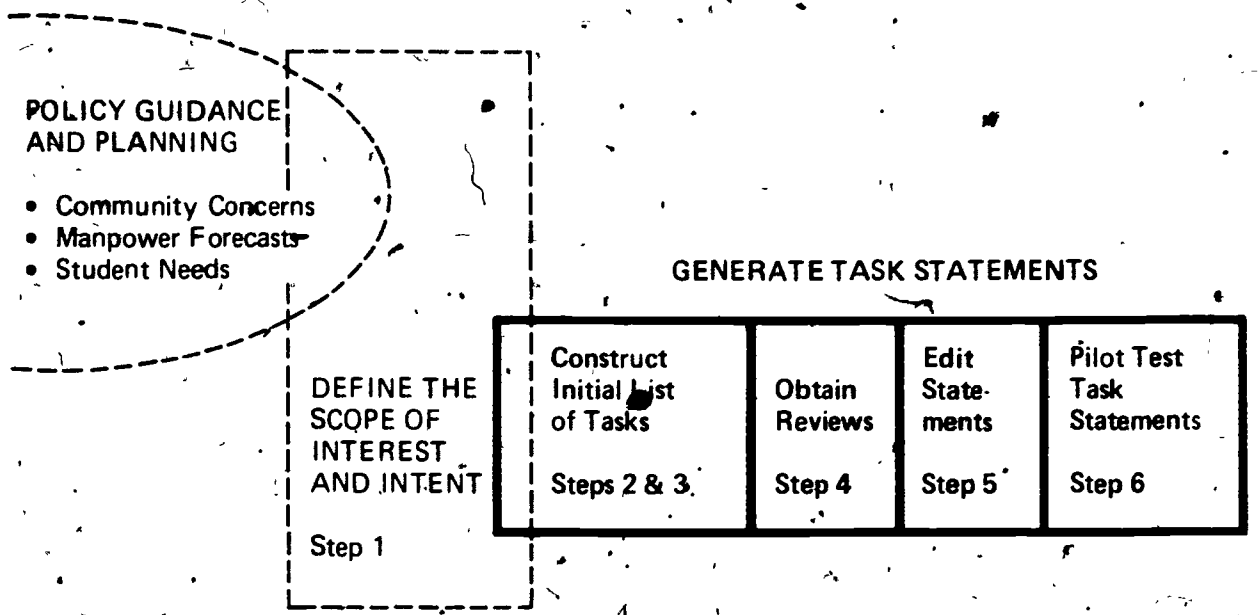
Self-Test Rating of Statement Adequacy

Activity Statement	Characteristics of the Statement				Overall Adequacy for Purpose	
	Grammatical Conformity	Only One Task Activity	Clarity of Action Intended	Purposeful Job-Oriented Activity	For Training Content Decisions	For Job Clusters or Description
Automotive Maintenance Activities						
1 Develop plans for performing maintenance.	OK	NO	NO	OK	NO	OK
2. Check and correct engine bearing fit.	OK	NO	OK	OK	NO	OK
3. Estimate charges for vehicle repair.	OK	OK	OK	OK	OK	OK
4. Establish methods to improve maintenance procedures.	OK	NO	NO	OK	NO	OK
5. Analyze and repair electrical control circuit for overdrive unit.	OK	NO	OK	OK	NO	OK
6. Resolve technical problems.	OK	NO	NO	OK	NO	Too Broad
7. Analyze for moisture or foreign particle level in fuel system.	NO	NO	OK	OK	NO	NO
8 Visually inspect front suspension system.	OK	OK	OK	OK	OK	OK
9 Check vehicle maintenance records for compliance with warranty policies.	OK	OK	OK	OK	OK	OK
10 Perform cylinder balance test.	OK	OK	OK	OK	OK	OK
Secretarial and Accounting Activities						
11 Operate tape recorder.	OK	OK	OK	NO	NO	NO
12 Use proofreading symbols.	OK	OK	OK	NO	NO	NO
13. Compare copy for legibility and neatness.	OK	OK	OK	OK	OK	Too Specific
14 Work with city tax statements.	NO	NO	NO	OK	NO	NO
15. Supervise clerical employees.	OK	NO	NO	OK	NO	Too Broad
16 Inspection of inventory records.	NO	NO	NO	OK	NO	NO
17. Compose copy at the typewriter.	OK	OK	OK	OK	OK	OK
18. Serve as notary public.	OK	NO	OK	OK	No, But Useful Summary of Fringe Activity	OK
19. Take dictation over the telephone.	OK	OK	OK	OK	OK	Too Specific
20. Listen for rumors.	OK	OK	OK	NO	NO	NO

ACTIVITY C: CONSTRUCTING THE LIST OF POTENTIAL TASKS



Given the scope of interest as defined in Step 1, there are five procedural steps to be performed to construct the list of potential tasks for an occupation, area, or function. The validation of this list of occupational activities, to establish which tasks are in fact a significant part of each occupation or function, is described in Volume 3 of this series, *Identifying relevant job performance*. The five steps for generating the tasks to be validated are:

- Step 2: Locate Written Sources of Work Activities
- Step 3: Construct Initial Listing of Tasks
- Step 4: Obtain Reviews of Initial Tasks
- Step 5: Edit Tasks for Use in Occupational Surveys
- Step 6: Pilot Test the List of Potential Tasks

Each of these steps is described in the sections which follow. It should be remembered that the task concerns described and the procedures for constructing lists are written to cover a wide variety of occupations for which task inventories might be desired. For any one occupation some portion of these concerns and procedures may not be pertinent. The total description is provided to aid in the preparation of task lists whenever particular situations or conflicts should arise.

STEP 2: LOCATE WRITTEN SOURCES

The initial listing of possible tasks for an occupation, area, or function is constructed from available printed source materials. Acquisition of these reference materials should start well in advance of the actual construction of the initial task listing to allow for lag time between the identification and receipt of some materials. It is not necessary to acquire every conceivable reference, but enough to begin roughing out an outline of the job and to generate perhaps a hundred or more statements of likely work activities per occupation.

Useful reference material often may be found in:

1. Published job materials, handbooks, and manuals.
2. Job analysis studies conducted by the U.S. Employment Service, its occupational analysis field centers, and state employment services.
3. Employer training programs, including those conducted by the armed forces technical schools and by other federal agencies.
4. Task inventories previously developed by others.
5. Curriculum guides prepared by state vocational curriculum laboratories, public school systems conducting occupational education, and private business and trade schools.
6. Empirical studies to establish the content validity of employment tests.
7. Special projects yielding occupational descriptions, such as graduate dissertations in collegiate schools of industrial psychology, industrial management, industrial engineering, industrial arts or vocational education, business, applied arts, and various specialized occupational disciplines. Many of these may be located through the *Dissertation Abstracts International: Section A (The Humanities and Social Sciences)*, a monthly publication of Xerox University Microfilms, Ann Arbor, MI 48106.

Additionally, special projects may be sponsored by state departments of vocational or occupational education, special interest groups, business and professional associations, labor organizations, consortiums of community colleges, HEW's Office of Education, National Institute of Education (HEW), National Institute of Health (HEW), Employment and Training Administration (formerly Manpower Administration, U.S. Department of Labor), National Highway Safety Administration (U.S. Department of Transportation), and others. Useful sources for identifying some of these organizations which have special interests in particular occupations are the following annual directories:

National Trade and Professional Associations of the United States and Canada, and Labor Unions, published by Columbia Books, 734 15th Street, NW (Room 601), Washington, DC 20005.

Encyclopedia of Associations. Volume 1: National Organizations of the U.S., published by Gale Research, Book Tower, Detroit, MI 48226.

For new and emerging occupations, it may be necessary to search references which pertain to more established occupations in the fields out of which the occupations are being created. None of

these sources is anticipated to provide a completely valid and useful source of all currently relevant task statements. They should, however, provide an effective beginning point, and will serve to orient persons developing the list of potential tasks.

Reference materials. Following is a list of possible specific sources of appropriate reference materials. These sources may be contacted for leads, bibliographic citations, and/or abstracts of likely printed references. Depending upon the occupational area, some of these sources may be more appropriate and productive than others.

Contact: CVE Publications
The Center for Vocational Education (OSU)
1960 Kenny Road
Columbus, OH 43210

- *Resources in Vocational Education* (formerly called *Abstracts of Instructional and Research Materials in Vocational and Technical Education,* AIM/ARM).

  Includes (a) abstracts of published materials designed for teacher or student use in the classroom, (b) annotations of bibliographic or lists of instructional materials, (c) abstracts of published research and other materials that are useful to a wide audience having an interest in vocational and technical education. Many curriculum guides contain some type of job description or task listing. While these vary in detail and completeness, they can serve as useful sources of initial statements of work activity.

  Published quarterly.

- *Annual Index to Resources in Vocational Education* (since 1977), and *AIM/ARM Annual Index* (1968 through 1976).

  Resources in Vocational Education and the Annual Indexes are normally obtained by subscription. Single copies of back issues of AIM/ARM periodicals and indexes are available only in microfiche and hardcopy reproduction from ERIC Document Reproduction Service, P.O. Box 190, Arlington, VA 22210. Copies are generally available in most State Departments of Vocational Education or their Research Coordinating Units.

- *Directory of Task Inventories: Volumes I, II, and III* (1975, 1976)

  Reports bibliographic information on sources of task inventories for occupations, compiled from documents submitted from state vocational and occupational education agencies, state vocational education instructional materials laboratories and projects, school districts, public and private R&D agencies, armed services training and personnel research agencies, as well as special projects sponsored by a variety of federal agencies, businesses, professional associations, and foundations.

Contact: ERIC Document Reproduction Service (EDRS)
P.O. Box 190
Arlington, VA 22210
(or)
Superintendent of Documents
U.S. Government Printing Office
Washington, DC 20402

▶ *Resources in Education* (RIE).

Lists abstracts and resources of new educational research documents entering the ERIC Clearinghouse system.

Published monthly, plus annual indexes.

Contact: Macmillan Information
866 Third Avenue
New York, NY 10022

▶ *Current Index to Journals in Education* (CIJE).

Contact: Information Coordinators, Inc.
1435-37 Randolph Street
Detroit, MI 48226

▶ *Work Related Abstracts.*

Divided into 20 broad subject areas, citing articles extracted from over 250 management, labor, government, professional, and university periodicals.

Published in monthly issues, with annual index.

Contact: National Technical Information Service
U.S. Department of Commerce
5285 Port Royal Road
Springfield, VA 22161

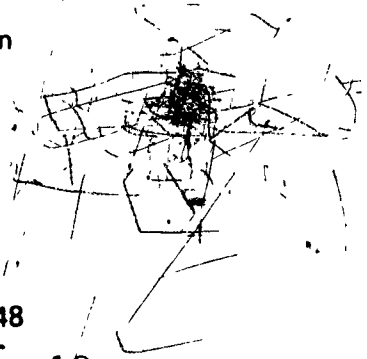
▶ *Government Reports Announcements and Index.*

Technical Inquiry Services of NTIS provides custom searching of an information collection relevant to specific queries.

These announcements are published every two weeks.

Contact: American Psychological Association
1200 17th Street, N.W.
Washington, DC 20036

▶ *Psychological Abstracts.*



- *Psychological Abstracts Information Services* (PsycINFO).
- *Psyc INFO Users Reference Manual.*

Other Potential Contacts: A large number of behavioral R&D agencies have over the years produced task inventories for a variety of curriculum and job analysis purposes. Copies of their directories or bibliographies of agency publications often can provide a good means for identifying many useful sources of task statements which may have been identified as part of various R&D projects. Additionally, within many of the state departments of vocational or occupational education there are Instructional Materials Laboratories, Curriculum Development Centers, and Research Coordinating Units which may have prepared task listings for selected occupations.

A number of agencies in the armed services and other governmental departments also produce job descriptions for occupations within their jurisdiction. These occupations may have many elements in common with occupations in other employment settings, and thus serve as useful starting points for constructing task statements. Similarly, many large businesses prepare job descriptions for use in curriculum development or for the validation of employment tests. The availability or usefulness of these sources would need to be explored on an individual basis.

Sources of general descriptions of numerous occupations. Certain reference sources contain general descriptions for a wide array of occupations. These descriptions can often provide useful overviews of an occupation or area, and suggest key issues around which task statements may be developed. As in any published description of a job, the material may be somewhat dated or lacking in representation of the intended scope of a study. Caution needs to be exercised in its use. It can serve, however, to construct initial listings which later can be validated by new occupational survey information. Useful sources of these general descriptions of occupations are the following publications, most of which are periodically updated:

Contact: Superintendent of Documents (or) GPO Bookstores
U.S. Government Printing Office
Washington, DC 20402

- *Dictionary of Occupational Titles, 1965. Volume I: Definitions of Titles* (3rd ed.).

  Produced by U.S. Department of Labor, Manpower Administration, Bureau of Employment Security, U.S. Employment Service, Office of Manpower Analysis and Utilization.

- *Task Analysis Inventories. A Method for Collecting Job Information.* (USGPO Stock No. 2900-00163)

  Produced by U.S. Department of Labor, Manpower Administration, U.S. Employment Service, Division of Occupational Analysis, 1973. (Based on research of the Job Information Matrix System directed by D. Yoder and C. H. Stone.)

- *Occupational Outlook Handbook. 1976-77 Edition* (BLS Bulletin 1875). (US GPO Stock No. 029-001 01406-6).

Produced by U.S. Department of Labor, Bureau of Labor Statistics, Division of Manpower and Occupational Outlook. Also obtainable from BLS Regional Offices and on microfiche from National Technical Information Service, Springfield, VA 22161.

Contact: Chronicle Guidance Publication, Inc.
Moravia, NY 13118

▶ *Occupational Library.*

Contact: Education Specialists
Navy Recruiting Command's District Offices

▶ *Work in the Navy—A Description of Navy Officer and Enlisted Occupations.*

Authored for the Office of Naval Research by M. N. McDermott, B. Paramore, and W. T. Callahan of Operations Research, Inc., June 1975.

Contact: Armed Forces Vocational Testing Group/RDX
Universal City, TX 78148

▶ *Military-Civilian Occupational Source Book.*

Illustrates the commonality between military and civilian occupations; first edition published July 1975 for the U.S. Department of Defense.

Contact: Educational Coordinators or Administrative Officers
Army Recruiting Command's District Offices

▶ *U.S. Army Career and Education Guide.*

▶ *Information Center.*

Both of these sources are part of the 1975 *Educator Package* of career counseling materials for use by educational staff, students, and parents.

Contact: Science Research Associates, Inc.
259 E. Erie Street
Chicago, IL 60611

▶ *Occupational Briefs.*

Contact: Doubleday and Company, Inc.
501 Franklin Avenue
Garden City, NY 11530

▶ *The Encyclopedia of Careers and Vocational Guidance.*

Contact: The Institute for Research
610 S. Federal Street, 7th Floor
Chicago, IL 60605

▶ *Careers Research Monographs.*

Contact: Finney Company
3350 Gorham Avenue
Minneapolis, MN 55426

▶ *Occupational Guidance Units.*

Many of these documents should be available for reference in the Guidance and Counseling Office or the Career Information Center of local high schools, community colleges, area vocational schools, and postsecondary technical institutes and colleges.

STEP 3: CONSTRUCT INITIAL LISTING OF TASKS

Length of initial task inventory. As noted in Step 1, the number of task statements that may be possible is dependent largely on the scope of the occupation, area, or function for which information is to be sought.

Usually there will be about 100 to 300 tasks for a single prescribed occupation, possibly more for jobs characterized by a high number of nonroutine activities. For a closely knit cluster of related occupations, the listing generally consists of from 300 to 500 tasks. A single function cutting across several occupations might contain 20 to 100 tasks. These are general averages. For some occupations as many as 1600 tasks have been identified. However, when task inventories are constructed using less than 200 task statements for an occupational area, the statements likely may be so general that they will yield little information about the specifics of each occupation.

For use in making curriculum decisions, the number of tasks is less important than the quality and comprehensiveness of their statements. Useful task data cannot be obtained in occupational surveys if tasks are poorly stated or omitted.

This concern for number of statements differs when the task listing is to be used only for the identification of clusters of job types within an occupational area, or for other such job description purposes. The general recommendation for these nontraining purposes is to limit the number of tasks for an occupational area to less than 600 statements.

The inventory of tasks and related occupations, should be designed to cover all levels of a particular career or promotion ladder, to assure coverage of work that may be shifting its pattern of relevance to particular jobs and levels of assignment. In some instances, say where there is a large cluster of supervisory activities, it may be best to develop separate listings, one for the supervisory jobs and one for the technicians and other skilled workers.

In any case, the maximum length of task listings in a survey questionnaire is roughly determined by the number of statements that employees in the occupations can be expected to respond to on a voluntary basis. Ideally, any one worker shouldn't be expected to spend over two hours completing an occupational survey questionnaire. However, highly reliable group responses have been obtained for questions on the job relevance of tasks where the average individual response time for questionnaires was over three hours.

The key determiner is not how long it takes to complete a questionnaire, but *what length is necessary to obtain the information required for the types of analyses that must be performed and conclusions to be made.* Techniques are described in Volume 4 for modifying the questionnaire administration to shorten the time it takes any one respondent to complete a particular questionnaire form.

The initial listing of tasks can be consolidated for an entire occupational area, or listed separately for each identifiable occupation. Before using them in occupational survey questionnaires, however, task lists for separate occupations are to be combined into a single list for the entire occupational scope (defined in Step 1) to be covered by one survey. Thus, there need be no special concern at this early stage for grouping tasks separately for each occupation when scanning the written sources for likely tasks. Where there are tasks that overlap occupations these will be consolidated in the final list of potential tasks, thus helping to shorten the questionnaires when two or more occupations or career ladders are to be surveyed with a single task inventory.

It will be noted that several adjectives are being used here to identify task lists: *initial* listing and final list of *potential* tasks. These terms, initial and potential, are merely a convenient means for differentiating various points of development of the task lists. Initial listings are produced in Step 3. After reviews, editing, and pilot testing (Steps 4, 5, and 6), the resultant product is a list of potential tasks for use in occupational surveys. Upon completion of the occupational surveys, a third listing may be reported in Step 21. This would be the listing of *validated* tasks for an occupation.

Grouping tasks to help organize initial lists. While a more rigorous grouping of tasks will be established in the review and editing processes of Steps 4 and 5, it may be helpful at this early stage to organize tasks under logical duty groupings that reflect different functions and responsibilities. Quite often these duty headings will be suggested by headings from organizational charts and curriculum guides. At this stage of the process their labels can be arbitrary, though if more rigorous definitions of duties can be developed prior to Step 4, it certainly would be helpful to do so. Often, however, at this initial listing stage the proper duties may not be fully known for the full scope of an occupational area.

A *duty* essentially implies a relatively large segment of work activities that are related in some manner.

Such groupings may be based on subsystems of the equipment that is worked on. For example, automotive maintenance tasks may be listed under such duty groupings as engines, power trains, electrical systems, automatic transmissions, fuel systems, cooling systems, steering units, brake systems, front ends, air conditioning, and heaters. Additionally, there could be a need for groupings based on more functional duties, such as lubrication and general maintenance, maintenance control functions, on-the-job training activities, inspections, customer service, organizational planning.

For an entire occupational area, such as secretarial science, it might be helpful at this early stage to list tasks under headings of known or suspected specialty job assignments such as stenographic activities, bookkeeping and accounting activities, editing, receptionist activities, clerical activities, library services, and mail distribution activities. These will need revision in Step 3, but duties based on job types can be useful in early development of task lists.

There also may be a need for more functional responsibility groupings such as planning, supervising, coordinating, training, inspecting. Where supervisory activities within a complex occupational area are many, it can be helpful to group the supervisory tasks according to the type of worker or

function that is supervised. Thus, for the area of business data processing, there could be such duties as supervising data services functions, supervising ADP equipment operations, supervising programming functions, and supervising data systems analysis and design.

Within a duty grouping of tasks, the individual tasks are most commonly listed in alphabetical order. Other ordering systems may be devised, as desired, to aid in the organization of statements so that it can readily be determined whether a particular task (or a very similar appearing one) was already listed when a work activity is identified in one of the written sources. The alphabetical listing of tasks tends to group tasks where the worker action is similar. For instance, all *checking* tasks for an equipment subsystem would be located near each other. So, too, would all *adjusting* tasks. This will make it easier for reviewers in Step 4 to note tasks which are so similar that they can be combined into a single statement, and to identify any that are missing and should be added to the list.

Tasks might be recorded on index cards to facilitate grouping. A sort board could then be used as an aid in grouping the tasks, though a flat surface such as a table or desk would do.

Using task lists already prepared by others. In those instances where a listing of tasks is available from the work of others, for economy of effort and cost there is a need to examine the usefulness of those tasks for a particular occupational study. Ideally, they should:

1. Pertain directly to one of the occupations of interest within the intended scope of interest,
2. Be of recent origin and verified as relevant to the occupation,
3. Represent the entire occupation, not just the more critical tasks,
4. Be briefly and clearly stated in a manner consistent with the guidelines given above on Understanding the Nature of Task Statements.

Available lists that meet these requirements can be used directly in the initial listing of tasks, serving as a highly economical alternative to full performance of Steps 2 and 3.

More likely, however, previous listings will not be directly applicable. They nevertheless can serve as a starting point for detecting changes needed and additions to a previous listing. Often, with a little obvious editing, they can illustrate to people knowledgeable about an occupation what kinds of work activity statements are desired. As such they become a useful stimulus in Step 4 to enable reviewers to recall the tasks of the occupation.

In compiling tasks from written sources there are a number of cautions that need to be exercised. West (1973), in a study of bookkeeping activities in relation to high school curriculums in bookkeeping, found problems such as these:

1. Textbooks may tend to be unduly encyclopedic, and contain very rare accounting matters (producing a large number of unnecessary and marginally relevant task statements).
2. Published sources may contain the correct, classical terminology of the field, "whereas on-the-job terminology is often loose and has meanings at variance with the technically correct ones" (p. 181).

3. Frequent identification in written sources of bookkeeping activities based on manual record systems, "substantially failing to capture the gross changes in job duties occasioned by computerization" (p. 181). These differences can be masked by job use of the same terms to describe quite different work activities and accompanying learning requirements.

4. Specialization of job functions in large employment settings, as compared to broader job performance in smaller employing firms, with an accompanying phenomena that entry-level employees in large firms are assigned work having little resemblance to the content of traditional curriculums.

Such problems create a real pressure upon the review process of Step 4 to produce task statements which reflect actual job requirements within all aspects of the scope of interest defined in Step 1.

The listing of previous tasks may be that of an inventory already verified by your agency as relevant to an occupation or area. This will occur when an occupational survey is to be repeated, to update the task information and note trends since previous surveys. In this instance there is one additional type of information that may be of use: *task statements written in by respondents to a previous survey*. These provide useful clues to possible new and emerging tasks that are in the process of becoming relevant to an occupation. This is one means of keeping a task inventory a current and dynamic listing of potentially relevant work activities. Each repeated survey helps to update and make more comprehensive the full description of occupational performance.

Use of prior occupational surveys also will provide information on the extent to which each listed task is performed. Subsequent use of these validated listings can eliminate those tasks found not to be a meaningful part of the job, such as when less than 10% of the workers in an occupation do a particular task.

Caution should be exercised, however, in deleting tasks that received little indication of their performance. At least two situations could have caused a low indication of occurrence on a prior survey. First, the task may have been a very new one, based on new technology which was just entering the occupation at the time of the earlier survey. A resurvey would most certainly want to include such tasks, and perhaps even expand upon them during the Step 4 interviews. Secondly, some tasks may be performed by few workers in an occupation, yet they are performed only by workers with that occupation. For job description purposes such job-unique tasks should be listed. However, for making decisions about the content of preemployment training, tasks of low occurrence tend not to be of training concern and often may reasonably be omitted from the listing. Thus, whether to include low occurrence tasks in an inventory depends upon the purpose for which an occupational survey is to be conducted.

In reusing tasks from a prior survey by your own agency, do not change the wording of a task statement if you want to compare responses between the two surveys.

STEP 4: OBTAIN REVIEWS OF INITIAL TASKS

Following the compiling of initial lists of tasks from written sources there is a need to interview knowledgeable persons to refine and revise the listing prior to its use. Reviewers should examine the list for completeness, clarity, and understandability. The purpose of these reviews is to add missing task statements, delete obviously irrelevant tasks, improve the wording of vague or lengthy

task statements, identify appropriate duty categories under which tasks are to be grouped in the final listing of potential tasks, and (if more than one occupation is to be surveyed for an occupational area) combine comparable statements from separate lists prepared for individual occupations.

General guidelines for selecting reviewers. Reviewers should be selected for their current knowledge and practical experience in the occupation of concern, or in several functions within an occupational area. In most instances they will be workers employed in the occupation and/or immediate supervisors of such workers. As a group they need to represent recent experience with all the situations and contingencies defined in Step 1 as part of the occupational scope of interest. At a minimum it is advisable to obtain one worker or one supervisor for each occupation within the scope of a defined occupational area of interest. A supervisor that directly supervises several job types within the area is usually desirable as one of the reviewers.

One must be flexible in selecting informants to interview. It is not possible to know at the outset which reviewers will give the most useful and complete information, nor precisely how many interviews will be warranted. From three to eight interviews are adequate for most inventories of a narrowly defined occupational area. However, as a rule and to the extent practicable, the more interviews, the better. Conclude the reviews when it is believed that the preliminary form is well structured and essentially complete.

It is usually desirable to interview persons from several different kinds of businesses and industries, to obtain a broad representation of the employment settings in which an occupation occurs. This also avoids getting only the organizational structure and work breakdown of a single type of establishment. There can be a very significant difference in the operations of very large as compared to very small shops or offices. Again, reference must be made to the scope defined in Step 1, to assure reviews cover the entire range of intended situations, conditions, and contingencies. Where the intended training program is to be specialized for a particular type of industry or business enterprise, the scope of representation should be restricted accordingly.

To obtain information about new trends in an occupation, it will be necessary to find people knowledgeable about what tasks are new and will occur with increasing frequency among workers. In every metropolitan area or industry there are individuals aware of changing work patterns and new technology being introduced. Interviews with such individuals, possibly by phone, can introduce increasingly relevant tasks into an occupational listing whereas local employees may not yet be fully aware that such work will become a significant part of their job. As examples, tasks dealing with electronic ignitions are increasingly relevant for auto mechanics, as is the operation of new word processing systems for secretaries.

Sources of individuals likely to be knowledgeable of such current trends can often be found in local unions or national headquarters of professional associations, labor unions, industrial or business trade associations, as well as vendors, craft or vocational advisory committees, and instructors in accredited training institutions. If these persons are not themselves knowledgeable of the specific tasks involved they often can provide leads to persons who are. Job analysts of the U.S. Department of Labor's Occupational Analysis Field Centers and of state employment security services may also be a good source of information about changing features of occupations; as may be Apprenticeship Committees composed of management and labor personnel, and training directors in industries involved.

Special considerations for new and emerging occupations. A special selection problem occurs in trying to list the tasks of new or emerging occupations, where experienced workers and supervisors may be few or have a very limited view of the occupational changes that are occurring. This is particularly critical because it is for just such jobs, where work performance information is uncertain, that new curriculum content or job descriptions often are sought.

The two most obvious problem situations are (a) the deliberate creation of new job types, with tasks taken and restructured from older existing occupations; and (b) the emergence of a major new technology or equipment system for which no directly related occupation exists. Historical examples abound of new technology creating new occupations in such fields as electronics, data processing, solar energy, transportation, communications, and chemical engineering.

By the time that training programs are expected to be developed to prepare many workers for a major new technology, there typically will have been an interim of time in which the producing industry has acquired some work and training experience in that area. Individuals to serve as informant sources can usually be found among the technology developers or equipment designers, factory technicians or service repairmen, systems analysts, company training personnel, and early groups making use of the new technology or equipment system. These sources will enable an initial list of tasks to be compiled, though such lists may need considerable revision later as workers gain experience and familiarity with the new occupation.

It is also likely that at least some portions of the work have counter-parts in a variety of existing occupations which can serve as a source of a portion of a task list. For instance, certain operations or the use of particular tools and devices may be components of older jobs. These can be sought out as appropriate and, with minor modification to fit the new job context, will anticipate some tasks that are likely to be relevant.

Where a job is being created almost entirely out of older existing occupations, such as has been happening with paraprofessional and technician occupations, the older jobs provide the source of most tasks to be listed. For example, the tasks of dental auxiliaries are created out of the tasks of dentists and of occupations in the fields of business and office management, patient care, and dental laboratory work. Such new jobs evolve partly as a function of how each employer sees fit to use them. In the dental assisting job type, Terry (1973) found that two different specialty jobs were in fact emerging, as dentists individually were utilizing their services in different ways; and that both of these dental assisting specialty jobs were more related to a third job involving dental hygiene, than they were to each other. Such evolving interrelationships can have substantial impact on curricular decisions about what different training programs are needed and what should be the content of each.

In these newly emerging and evolving occupations it will be necessary to seek more than the normal number of reviewers, to assure coverage of the various performance situations. Additionally, it becomes much more difficult to resolve conflicting suggestions from different reviewers, since each may be experienced with an opposing view of the occupation as it is evolving. It generally will be necessary to retain every task that is suggested by a reviewer, even if other reviewers declare it to be irrelevant to the occupation. Subsequent survey data (per Volume 3) will provide the representative information base to establish how relevant is each task.

The reviewers, to be knowledgeable of tasks comprising such an occupation, may need to include other than workers and immediate supervisors. Likely sources include:

- In some occupational fields (such as medicine and engineering) committees of professional associations serve as knowledgeable proponents of changes in occupational structures.
- Workers in the older established jobs, out of which tasks for an emerging occupation are being extracted, can provide much task specificity of possible work activities. These workers and their supervisors may be able to speculate about the question of "What tasks can be handled by the new type of worker?" Similarly, they may be able to break down some of the older tasks into component subtasks which might serve as units of meaningful work

activity for persons of lesser overall capacity, if such is the intended caliber of workers for the emerging occupation.

- Employers and supervisors of the new kind of worker should be able to communicate their intentions of how they will utilize this occupation. This group can also indicate which activities cannot be assumed by the new workers because of governmental licensing constraints, labor contract limitations, professional codes of ethics, or governmental laws and regulations.

- Community resource people, having an active concern for the area or for the type of person for which the new occupation is suited, may provide useful leads to potential work activities.

General considerations for the review process. In most cases it should be possible to find knowledgeable reviewers who are willing to take a few hours to go over an initial listing of tasks, and to suggest additions and modifications. However, if funds are available, it may prove worthwhile to pay the reviewers (or to compensate the employer if company time is used) a nominal fee to insure their full attention to the review. Generally, such a fee paid should be equal to or greater than the reviewer's current hourly wage. Contact with a management representative of the employing agency is encouraged in all instances, to secure cooperation and to keep employers informed of what is desired of their employees.

Personal identification data should be obtained for each reviewer. This information usually should include name, job title, organization, and address of the reviewer and his supervisor. A letter of appreciation should subsequently be sent to each participant, with a copy to the cooperating supervisor. It is also useful to obtain the telephone number of each reviewer, as well as notes on the scope of his work experience, for later use in Step 5 as conflicting information needs to be resolved.

Before beginning a review of the initial task listing, the purpose and uses of the eventual task inventory should be explained to the reviewer. The reviewer should clearly understand how the tasks are to be stated and how specific they are to be. It may be necessary to stress the fact that the listing is not a test and that knowledge items should not be included.

The interviewer should not attempt to secure perfectly polished task statements in the interviews, but should accurately record the main substance of new statements and revisions in a form that can be edited later. The reviewers should not be considered experts on how to write task statements, but should be used to review the substantive content of the tasks initially listed.

Forming the final duty categories. The first few reviewers used should be asked particularly to help in structuring and stating the duty categories under which the tasks should be organized for the final listing. After scanning the tentative duty categories and tasks contained in the initial list, and possibly suggesting some additional activities, the reviewer should then be asked to concentrate on the duty categories themselves. They should be examined one by one for relevance, accuracy, and usefulness as organizers of task statements. After settling upon a set of duties, each task of the initial listing is to be placed under its most relevant duty category. A few reviewers should be able to do this readily. As new tasks are noted they can be categorized at that time, or later in final editing.

Whereas the initial grouping of tasks into duty categories (Step [illegible]ay be very tentative and arbitrary, there are some definite considerations for duty statements used in subsequent listings.

DEFINITION OF A DUTY

Duties are functional divisions of a job (or of an occupational area) into categories of related tasks for descriptive purposes. They represent relatively large segments of work performed. The relationship among tasks within a single duty typically is based upon a commonality of (a) types of action, (b) systems or subsystems of objects acted upon, (c) areas of responsibility, (d) location or time of performance, (e) work goals, or (f) types of technical knowledge subject matter that is of practical use in performance of the tasks.

The duty statement is a label reflecting the types of tasks grouped under a particular division of a job or occupational area. Typically there are three somewhat different forms of duty statements:

- ☐ Single action words ending in "ing" to reflect a general function or area of responsibility. For example, organizing, planning, implementing, training, inspecting, coordinating, evaluating, performing, operating, maintaining, troubleshooting, repairing, removing, replacing, adjusting, installing. Sometimes the word "activities" is added to the action word, such as "training activities." Sometimes double action words are used to more fully describe a duty area, such as "organizing and planning activities" or "removing and replacing activities."

- ☐ Single action words and their associated objects, reflecting classes of things or systems acted upon. For example:

  - Repairing transmissions
  - Maintaining files
  - Coordinating data services functions
  - Performing feasibility studies
  - Designing data systems
  - Programming computers
  - Repairing electrical systems

- ☐ Classes of things or systems acted upon, without specifying the class of actions to be taken. For example:

  - Engine overhaul activities
  - Electrical system activities
  - Cooling system activities
  - Scientific programming activities
  - Dictation related activities
  - Clerical activities
  - Mail and distribution activities

There is no single correct type of label, but there are types of labels which should be avoided. *Duty statements should not reflect or imply a type of job within the occupational area, nor a job specialty within one occupation.* Respondents on occupational survey questionnaires sometimes

skip over an entire duty section without reading the task statements if the duty label represents a job other than their own. Since tasks are organized under duties on a very subjective basis, there is a chance that skipping over a duty section will cause relevant tasks to be omitted from the survey responses, providing potentially misleading task data. An example might be the task of "Establish work priorities" which at first glance would seem to be grouped under a duty labeled "supervising activities." Yet many secretaries perform the task daily to assure the timely accomplishment of critical typing assignments. If the secretaries answering a survey felt they were not supervisors, they could easily overlook that relevant task.

The term "supervising" should never be used as an action word, either in a duty or in a task statement. Examples of improper duty labels reflecting particular jobs are given below, along with possible substitute duty statements that serve to mask any job-specific identification:

FAULTY	POSSIBLE ALTERNATIVES
• Supervising Activities (implies work done only by a supervisor)	• Organizing and Planning Activities • Maintenance Control Activities • Implementing Activities • Employee Training Activities
• Stenographic Activities (implies work done only by a stenographer)	• Dictation-Related Activities
• Receptionist Activities	• Public Contact Activities
• Mail Room Activities	• Mail and Distribution Activities

Duty categories are intended to include a relatively large segment of work, regarded by workers as "natural" divisions of work functions of individuals. Workers in a particular occupation or area may perform a number of related tasks which can logically be grouped together. If few tasks (say less than 10) are found for a particular duty category, related duties may be combined to form a single larger category, with a composite label reflecting both categories of work.

Duty categories based on proposed standard sets of action verbs have been created in the past for particular occupational areas, but their merit has not been established for task inventory survey purposes. They are mentioned here only for possible experimental use, particularly for grouping skills that may enhance transfer of training to others within the group. One difficulty in their use is the more rigorous requirement that tasks be placed in one correct category. Classifying tasks reliably is very difficult, particularly if the persons judging the classification are somewhat unfamiliar with either the job tasks or the definitions of each standard verb.

One source of 28 standard verb listings are the Worker-Function Scales for action upon data, people, or things. These scales were described by Fine and Wiley (1971) and formed one basis of the Department of Labor's occupational classifications in the 1965 edition of the *Dictionary of Occupational Titles*. Stone and Yoder (1970) define a standard list of 87 hierarchically structured data-oriented activity verbs and 69 people-oriented activity verbs. Another set of 23 verbs was proposed by Miller (1971) for use in stating what a work system is supposed to do in terms of a chain of functions between system input and system output.

With respect to the occupational survey approach described herein, the concern for classifying the type of behavior involved in a task is reserved for later steps in curriculum development, after it has been established which tasks are job-relevant and important for training consideration. That

stage is beyond the scope of the procedures in this manual. Volume 1 and 4 briefly discuss the uses of selected job performance content as the focus of later, more-detailed task analysis efforts.

Reviewing the initial task statements. After the labeling of duty categories has been accomplished and tasks appropriately grouped, subsequent reviewers should be given a copy of the listing for their examination. Beginning with duties most central to an occupation, the person conducting the interview should in turn read each task statement aloud and ask leading questions about the particular task. Pursue this probing by use of such questions as:

1. Is the task statement clear? Will all workers in the occupation and their supervisors understand what this means? Is it clear what type of work activity is represented by the statement? Can it be stated effectively in a briefer manner?
2. Is this task covered in part or entirely by another statement in the list?
3. Does this task fit better under another duty?
4. To your knowledge, is this task performed by any workers in the occupation? In the occupational area?
5. Is the work statement sufficiently broad or inclusive of several activities that it should be broken up into statements of several tasks?
6. Are there significantly different ways of performing the task, such that different skills are required?

Such questions are not intended to be leading; they should not obscure information or interject interviewer bias. According to the study reported by Mayo (1969), their chief purpose is memory stimulation. They merely ask the reviewer to expand on the description of work performed.

Semantic problems should be clarified during these interviews. Particularly be alert to indications that a statement of a task may have different meanings for different workers. For example, as noted by Mayo (1969), the statement "Monitor workloads of shop personnel" may be interpreted to mean "Make work assignments," "Prepare daily work assignments," or even "Edit time cards of shop personnel."

In most instances, all tasks under a duty heading should be covered before going on to the next duty. Question the reviewer for any other tasks that should be listed under that duty.

Probing for additional tasks. If the duty is one of maintaining a major piece of equipment, it sometimes can be helpful to identify each component of that equipment and systematically ask whether each component is diagnosed, removed, repaired, inspected, cleaned, adjusted, assembled, or serviced. Construction of a matrix of actions and components, such as illustrated in Figure 3, can be helpful for large complex equipment systems, to assure comprehensive coverage of all possible tasks.

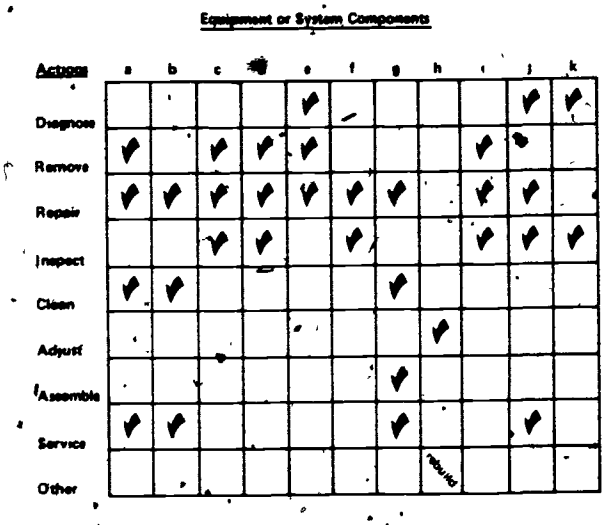


Figure 3. Format of matrix of actions and components.

If the duty involves the complex operation of a machine, or the intricate processing of data and information, it may be necessary to prepare a flow diagram of the tasks in a typical job cycle. "A job cycle is a sequence of activities from some starting condition to the return of that starting condition" (Miller, 1962, p. 53). Miller cites the operation of an airplane and a typist working on a draft manuscript (possibly involving several stages of revision) as examples of job functions in which there can be a cycle of task activities. The flow diagram would show the sequence of task activities performed throughout the cycle. It is also possible to portray additional tasks that may have to be performed at about the same time as the primary tasks of the cycle. The flow diagram provides one means of assuring completeness of task identification, and also may be useful for possible later more detailed analyses of the tasks. For the purpose of task identification it is not necessary to include actual time units on the baseline of the flow diagram, but merely use a sequential block diagram form as illustrated in Figure 4, to show the tasks involved.

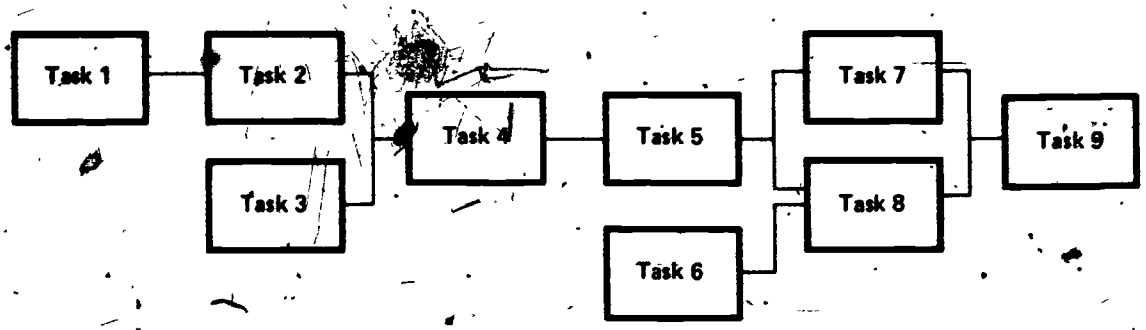


Figure 4. Format of flow diagram of tasks in a job cycle.

Another interviewing aid, especially for nonroutine or nonrepetitive areas of responsibility, is to probe for three general types of tasks within a duty category. These serve to gather information or to make determinations, or operate to control a work situation. That is, the three types represent a cycle of (a) finding out about something, (b) using that information to make a decision about the state of affairs and choosing a course of action, and (c) doing something about the situation to correct, modify, or influence it as necessary.

☐ *Information-gathering tasks* are performed primarily to obtain information about some job-relevant situation or the degree to which progress is made in the attainment of some job goal or standard. Typical action verbs might be such terms as:

Analyze	Count	Measure
Ascertain	Diagnose	Observe
Audit	Gather	Obtain
Calculate	Identify	Proof
Check	Inspect	Receive
Compile	Interview	Review
Compute	Inventory	Verify
Confer	Locate	Weigh

☐ *Determinations* are tasks performed in which judgments primarily are made about the existence, adequacy, or nature of deficiencies of some job situation or condition. Typical action verbs might be such terms as:

Compare	Estimate	Rate
Decide	Evaluate	Test
Determine	Judge	

☐ *Controlling tasks* are performed primarily to correct, maintain, operate, or report on some job situation or condition. They seek to change a state of affairs to provide progress toward the attainment of some job goal or standard. Typical action verbs are very numerous, including such terms as:

Address	Fit	Remove
Adjust	Greet	Repair
Approve	Grind	Replace
Arrange	Inform	Reprimand
Assign	Install	Revise
Attach	Instruct	Rewire
Balance	Load	Rotate
Clean	Log	Schedule
Compose	Lubricate	Select
Counsel	Notify	Set
Deposit	Open	Sign
Design	Paint	Solder
Develop	Phone	Sort
Disassemble	Plan	Straighten
Distribute	Post	Submit
Draft	Prepare	Transcribe
Edit	Process	Type
Endorse	Rebuild	Weld
Establish	Recommend	Write
File	Refer	

General statements of work activity commonly are given by people working in supervisory, managerial, and professional occupations. For these occupations it is typical to first elicit such activity statements as:

"I supervise my work force."

"I monitor the on-job training program."

"I advise clients on legal procedures."

"I assist salesmen in securing important accounts."

"I insure that proper safety precautions are taken."

"I control the flow of work."

"I coordinate activities with another department."

"I plan emergency procedures for. . . ."

"I consult with the attorney."

"I maintain back-up procedures for the operating system."

"I maintain training records for office personnel."

"I serve on inspection teams."

"I train personnel on new procedures."

"I evaluate work performance of each employee."

"I lead inspection of conversion teams."

"I follow up on requisitions."

"I initiate procedures for the preparation of annual reports."

"I prepare reports for government agencies."

Because of the ongoing nature of many such functions, and the typical way many jobs are described by incumbents at a very general level, it is often difficult to get an interviewee to think in terms of work activity at a task level of specificity. The interview can get bogged down if no technique is used to break up general activity or goal statements into their component tasks. Probing for each of the three types of tasks is one useful way of accomplishing this. By deliberately asking about each type of task activity for an area of responsibility, the interviewer will find an array of tasks actually performed. If a task of information gathering or of determination is identified, then there must be at least one of each other type associated with it.

It should be realized in listing the tasks of each type that not all persons in the occupation will do all of them, nor will any one person do the same things every time. Rather, these tasks indicate possible activities, from the experience and knowledge of the reviewers (and as indicated by written reference sources), that are likely to occur in relation to an area or condition for which workers in the occupation are responsible.

STEP 5: EDIT TASKS FOR USE IN SURVEYS

Final changes and organizing of tasks. When the Step 4 interviews are completed, assemble all initial task lists used during the reviews. All revisions, new task statements, and comments of the reviewers should be copied from these sources into a single list.

Final decisions to accept or reject the proposed changes should be made by the persons who constructed the initial list of tasks and conducted the interviews with reviewers. Further consultation with a knowledgeable person may be necessary for some tasks, especially if conflicting revisions or suggestions have been given by the reviewers. Most of these problems can be solved by reference to a published source or by a telephone call to an authority in the field.[3]

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[3] A more formal routine for classifying large quantities of interview information and of integrating review suggestions may be found in a report by Morsh and Archer (1967, pp. 15-18).

Once these decisions have been made, all task statements (especially new or revised ones) must be checked to determine whether they are consistent in format. As a minimum, each statement should have a single action verb and an object of that action (that is, the item acted upon). Only when it is necessary for clarity should a modifier or qualifier be used. Refer to the section on Understanding the Nature of Task Statements for a complete review of appropriate task characteristics.

If the occupational survey is to encompass several occupations, the task lists for each occupation need to be consolidated into one list for the intended occupational area. In consolidating lists, be careful not to lose the meaningfulness of the task statements for each separate occupation (refer to Problem Area No. 7 in the section on Understanding the Nature of Task Statements for a computer programmer example on differentiating between similar jobs).

In terms of organizational format, all statements falling under a duty should be arranged alphabetically by the first action word (for example, Adapt, Build, Compose, . . .). This tends to group tasks representing a related series of work variations, such as (a) tasks with differing purposes but with a common type of action verb or (b) differing methods for accomplishing the same basic job task. Such sequencing will help survey respondents detect missing tasks and help reduce the time each spends completing the survey questionnaire. Future modifications to the listing are also easier to make.

Duties may be sequenced in any order that seems natural for the occupation or occupational area. However, at least one duty central to a nonsupervisory function should be located as one of the first two or three duties (unless, of course, only a supervisory occupation is covered by the list). This serves to assure survey respondents, whether they be workers or supervisors, which occupation is being surveyed. If too many tasks of a directing-planning-organizing nature are located first in a survey questionnaire, some supervisors will mistakenly begin rating their own job as supervisor. And some workers will get the impression that the task listing does not pertain to their job.

Duties that may be peripheral to the occupation should be interspersed throughout the list. If they are all bunched at the end, there is some tendency for survey respondents to ignore them and omit task ratings.

A way to check on the level of task specificity. If there is uncertainty that activity statements are sufficiently specific and not representing general levels of work, it is possible to have a few people rate each statement. This may be useful also as a learning device to use with persons who are inexperienced in stating tasks, to draw their attention to discrepant statements.

Obtain at least five persons who are sufficiently knowledgeable of the occupation to understand what work is represented by the listed activity statements. Describe to them the intended level of specificity, illustrating with statements that are too broad and general, too specific and detailed, and some that are stated at just about the right level of specificity for a task. These illustrations need not be from the same occupation.

Ask these persons to read each activity statement carefully and to give it a rating from 1-to-7, with a rating of 4 being used for a proper task level of work activity. Their ratings can be written beside each listed task, and later summarized for all raters on a separate listing. Caution the raters *not* to use the high end of the scale to reflect good,

Far too general		Task-level specificity				Far too specific
1	2	3	4	5	6	7

clear statements of tasks, with the low end being poor statements. This is to be a rating of specificity of the activity represented, not of the clarity of the statement. The "4" rating is the desired objective, not the "7."

When five raters are used, four out of five should have rated an activity statement at a level of 3, 4, or 5. Any tasks that fail to achieve this degree of agreement should then be tagged for more critical review. If necessary, additional reviewers can be obtained and Step 4 repeated for those tagged activity statements.

If more than five raters are used, a proportionate degree of agreement can be used for ratings of 3, 4, and 5 on the scale. Activities stated at such a level of specificity provide information having greater usefulness in later efforts (Volume 4) to select curriculum content, than do activities stated at a level of 1 and 2.

STEP 6: PILOT TEST THE LIST OF POTENTIAL TASKS

Before putting the duty and task statements into final form for use in a printed occupational survey questionnaire, it is a good idea to try them out. After a final thorough proofreading, the revised duty and task statements are ready for tryout with a few workers in the occupation or with others who are representative of the types of persons to whom the occupational survey is to be administered. A draft form of the task list will be adequate for this purpose.

The goal here is to obtain some firsthand feedback from job incumbents about the communicability of the statements. To do this, the developer of the inventory should locate a few job incumbents who are, hopefully, representative of the full range of incumbents who will eventually answer the questionnaire. Ask each one individually to read each statement. These persons should be asked to comment on any statement that appears confusing. The specific reason for the confusion should be obtained, if possible, and suggested revisions devised with their help.

The respondent should not be asked at this time to indicate whether he performs a given task, but rather to indicate comprehension of the statement of each task. It is the clarity of each statement that is being pilot tested, not the adequacy of the statements to describe what that person does.

Administration of these statements to several persons is likely to be time-consuming, especially if they find the statements difficult. Thus, it will probably be necessary to reimburse them for their time. The fee paid should be equal to or greater than their hourly wage.

This final list of tasks remains tentative *until validated by data from occupational surveys*, as described in Volume 3 of these procedures.

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RELATED PUBLICATIONS AVAILABLE FROM THE CENTER FOR VOCATIONAL EDUCATION

OTHER METHODOLOGIES FOR DERIVING CURRICULUM CONTENT

Related Center publications augmenting the procedures and guidelines of the five-volume *Performance Content for Job Training* are:

The initial adaptation of U.S. Air Force occupational survey procedures for application in civilian contexts. This version provides a useful introduction to the methodology of task inventory surveys.

Procedures for Constructing and Using Task Inventories (R&D Series No. 91), March 1973.

Complementing the focus on the task performance content of [illegible] is the methodology for surveying work-related technical concepts which have practical use to workers in the effective performance of their job. Concept inventory procedures are described and a descriptive report of job significance ratings is given for concepts in the occupations of automotive mechanics, business data programmers, and general secretaries.

Rating the Job Significance of Technical Concepts: An Application to Three Occupations (R&D Series No. 105), December 1974.

Exploratory ways of identifying that work-relevant affect by which workers in an occupation approach their job, their coworkers, and the entire work environment. Procedures are suggested, and initial tryout results are reported, for a promising approach to the identification of those non-technical aspects of the job which contribute to worker satisfaction and success. A companion report is provided for processing the associated worker data.

A Methodology to Assess the Content and Structure of Affective and Descriptive Meanings Associated with the Work Environment (R&D Series No. 98), December 1974.

RCMAT: A Computer Program to Calculate a Measure of Associative Verbal Relatedness (Occasional Paper No. 6), 1975.

OCCUPATIONAL SURVEY REPORTS

Providing field data for establishing the methodology of the five-volume *Performance Content for Job Training* are:

Three reports of task surveys conducted for specific occupations. These 1974 surveys were obtained from numerous communities in eight states distributed across the nation. Both workers and immediate supervisors, 200 per occupation, provided task data on an array of experimental questions pertaining to (a) task occurrence, (b) frequency of task performance, (c) task significance to the job, (d) time on job before task qualification is expected, (e) task importance to the job, (f) suggestions of performance problem areas, and (g) primary learning locations for each task.

Occupational Survey Report on Business Data Programmers. Task Data from Workers and Supervisors Indicating Job Relevance and Training Criticalness (R&D Series No. 108), December 1974.

Occupational Survey Report on General Secretaries: Task Data from Workers and Supervisors Indicating Job Relevance and Training Criticalness (R&D Series No. 109), January 1975.

Occupational Survey Report on Automotive Mechanics: Task Data from Workers and Supervisors Indicating Job Relevance and Training Criticalness (R&D Series No. 110), January 1975.

A 1971 survey of workers in one metropolitan area was conducted for entire occupational areas incorporating several specific occupations. Field data were obtained on (a) task occurrence and (b) relative proportion of time spent on each task. The survey reports include comparisons between related occupations, and generate the initial listings of tasks used in subsequent studies of specific occupations within each occupational field.

Automotive Mechanics Occupational Performance Survey (R&D Series No. 86), March 1973.

Secretarial Science Occupational Performance Survey (R&D Series No. 87), March 1973.

Business Data Processing Occupational Performance Survey (R&D Series No. 88), March 1973.

SURVEY OF CURRICULUM DEVELOPERS

Providing information on the activities and needs of curriculum developers is the 1974 survey of more than 300 persons in education and training, both public and private, throughout the nation. The survey analysis emphasizes the responses of curriculum developers concerned with vocational education to the list of 68 work activities, but includes other areas of public education, business/industry, and government agencies. Responses were given to activity questions pertaining to (a) occurrence of the activity, (b) degree of problem encountered in performing each activity, and (c) activity importance to the job.

Activities, Problems, and Needs of Curriculum Developers: A National Survey (R&D Series No. 115), May 1976.

TASK INVENTORY EXCHANGE

To promote the sharing and general availability of task inventories and of occupational surveys, a central clearinghouse is conducted for the collection and dissemination of materials prepared by agencies in education, labor, agriculture, industry, business, government, the professions, and various special interest groups. Three volumes of a directory of over 800 available task inventories so far have been published. Additionally, a symposium on methodologies was sponsored at which 15 presentations were made to an audience of 158 persons from 26 states, sharing their experiences, problems, solutions, and thinking on various aspects of the issue.

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