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ABSTRACT

A study was conducted that addressed job literacy in a cross-section of occupations. The Diehl-Mikulecky Job Literacy Survey was administered to 107 subjects who represented a full range of occupational types and levels and who comprised a sample similar to the adult working population on the demographic variables of sex, race, income earned, and occupational category. The survey included items to assess the literacy demands encountered in occupations, the strategies employed by subjects in meeting these demands, and select attitudinal variables hypothesized to influence functional literacy in a job context. Additionally, the survey provided an indication of general reading ability through the use of a cloze test on a general topic, and an indication of job-reading ability through the use of a cloze test constructed for subjects from their actual work materials. Several traditional measures of occupational success (income, job prestige, and job responsibility) were incorporated as variables in the study. The data collected were reduced to fourteen major variables (four variables tapping literacy demands, five tapping subjects' strategies and competencies, and five tapping attitudes) and several demographic variables. The interrelationships of the variables and their contributive effects in explaining variances in job-literacy competency, literacy demands, and occupations success were examined. (BM)

JOB LITERACY: A Study of Literacy Demands, Attitudes, and Strategies in A Cross-Section of Occupations

A Study funded by the Spencer Foundation

Project Director: Larry Mikulecky
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February 1980

Preface

The following study was funded by the Spencer Foundation of Chicago through Indiana University. It is the second in a series of studies concerned with adult reading habits, attitudes and abilities (see Mikulecky, Caverly, and Shanklin, 1979 in bibliography).

This particular study addresses job literacy in a cross-section of occupations. It has served as a pilot study for a larger National Institute of Education study (Job Literacy: The Relationship Between School Preparation and Workplace Actuality) which is currently being conducted in the Indianapolis Standard Metropolitan Statistical Area and is projected for release in early 1981.

Reporting this study within reasonable space constraints has necessitated brief coverage of some areas so that more detailed reporting of other areas could occur. In nearly all cases, descriptions of procedures and data analysis are sufficient for replication. If the interested researcher needs additional information, a more detailed accounting may be found in Diehl's doctoral dissertation, Functional Literacy as a Variable Construct: An Examination of Attitudes, Behavior and Strategies Related to Occupational Literacy.*

Larry Mikulecky
Bloomington, Indiana
January 1980

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*Unpublished doctoral dissertation, Indiana University, Bloomington, Indiana, 1980. Portions of this report are drawn from the dissertation and are used with permission.

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Study Overview

Studies of adult reading ability and adult functional literacy have been hampered by the inability of researchers and society at large to determine what is "functional" in terms of representative tasks and levels of competence. If representative tasks are difficult, the percentage of functional illiterates is high and if the tasks are simpler, the percentages decrease. The problem has been exacerbated by the breadth and diversity of reading tasks most adults encounter during an average day. Functional literacy is really a relationship between the reader, the context, and what is required to be read. It is a variable construct that can change from situation to situation and from person to person.

In order to gather meaningful information about adult functional literacy, the variable nature of the construct must be recognized and accommodated. Subjects must be assessed with material they actually have to read and, if at all possible, in the settings they usually encounter such reading material. In addition, the focus of research must more clearly identify and define the area of literacy being assessed.

This investigation addresses functional literacy as a variable construct and in an occupational context. One hundred and seven subjects--representing a full range of occupational types and levels, and comprising a sample similar to the adult working population on the demographic variables of sex, race, income earned and occupational category--were administered the Diehl-Mikulecky Job Literacy Survey. This survey includes items assessing the literacy demands encountered in occupations, the strategies employed by subjects in meeting these demands, and select attitudinal variables hypothesized to influence functional literacy in a job context. Additionally, the survey provides an indication of general reading ability through the use of a cloze test on a general topic, and an indication of job-reading ability through the use of

a cloze test constructed for subjects from their actual work materials. Several traditional measures of occupational success (income, job prestige, and job responsibility) are incorporated as variables in the study. The FORCAST readability formula is also employed to provide an indication of the reading difficulty of job material.

Data collected are reduced to fourteen major variables (four variables tapping literacy demands, five tapping subjects' strategies and competencies and five tapping attitudes), and several demographic variables (including income, job status, job responsibility, occupational grouping and length of time on the job). The interrelationships of these variables and their contributive effects in explaining variances in job-literacy competency, literacy demands, and occupational success are examined.

Background

Much attention has been directed in the past few years to the related areas of "functional literacy" and "minimal competency." Studies of functional literacy have suggested that a significant portion of the population cannot read and write well enough to meet basic literacy demands in the society. The media, as well as recent court cases (e.g., Peter W. Doe vs. The San Francisco Unified School District) have highlighted a growing concern that schools may not be providing students with reading and writing skills necessary to be "minimally competent." This concern has resulted in at least 33 states passing some kind of minimal competency legislation (Pipho, 1978). The concern with levels of functional illiteracy in the country has also resulted in some suggestions that a massive campaign be undertaken to alleviate the problem (see, for example, Sen. George McGovern's statement on World Literacy Day, 1978).

Although this concern about functional literacy is real and can be seen to be growing, it is based on research that is often conflicting, that has produced widely

differing results, and that is open to interpretation and even misrepresentation (Fisher, 1978). A number of problems underlie the assessment--and the promotion--of functional literacy. This study is designed to circumvent many of these problems by examining literacy in a real-life context, rather than using representative reading tasks to assess levels of literacy.

Philosophical and Theoretical Aspects of Functional Literacy

A number of factors have confounded the assessment and promotion of functional literacy; these factors have caused past assessments to vary widely in definitions, assessment measures used and, consequently, results. A study that would shed more light on the meaning and extent of functional literacy must carefully address these factors that have posed problems in past research:

1) Literacy has traditionally been approached as a fixed construct--one that was unchanging and that could be measured by a single instrument (Bormuth, 1975). An alternative view contends that literacy is an invented construct and is often influenced significantly by the social, political, religious, and economic climates of particular periods of history (Fudge, 1974; Olson, 1975; Diehl, 1979). Additionally, even within the same period of history, literacy has a variable nature. Literacy is not a single, optimum level of attainment, but it rather varies depending upon the skills of any one individual and the literacy demands that that individual faces. It is "a continuous process of applying specified skills to specified tasks" (Kirsch and Guthrie, 1978, p. 492).

2) Literacy measures have primarily been designed to yield binary classifications of people--either "literate" or "sub-literate" (Bormuth, 1975). Since literacy demands vary greatly, and since there are few, if any, individuals who could adequately meet all possible literacy demands, then most people would be "sub-literate" in some situations. Binary classifications of literacy must, therefore, automatically entail the use of arbitrary criteria. It is necessary to move beyond binary

classifications and to examine functional literacy as a continuum.

3) Literacy has often carried a symbolic value, above the utilitarian value, in our society (Fudge, 1974; Olson, 1975). Literacy is often viewed as the mark of a civilized person in a civilized society; conversely, illiteracy is often viewed as being automatically linked with backwardness, hunger, deprivation, crime, etc. (For example, a recent Newsweek article (Nov. 6, 1978) was headlined, "The Blight of Illiteracy." In this article, as well as in other articles and in speeches such as McGovern's in 1978, illiteracy is presented as an automatic correlate to--or even a cause of--many of society's problems.) In the past, this symbolic value has caused literacy to be used as a tool in barring immigration of certain peoples (Cook, 1978; Violas, 1978) and as a tool for denying the vote to black citizens. It now may cause educators and legislators to misjudge the actual levels of literacy needed in the society; it may also cause employers to misjudge and perhaps arbitrarily set the literacy entry requirements for many occupations. In order to avoid some of the influence of the symbolic values of literacy, it is necessary to examine actual literacy demands encountered in real life situations.

4) Partly due to the symbolic value of literacy, discussions of, and even assessments of functional literacy often equate this ability with overall competency (Kirsch and Guthrie, 1978; Fisher, 1978). It is too often assumed that an inability to read and write well indicates an overall lack of ability; an illiterate is often seen as automatically incompetent. Obviously, a worker could be functionally illiterate (i.e., he cannot read the materials supposedly necessary to complete a task) and yet be competent (i.e., he accomplishes the task anyway because of common sense, previous experience, etc.). Scribner and Cole (1973) and Olson (1975) indicate that attitudinal and behavioral characteristics--other than simple literacy ability--have a much greater impact on competency. In one of the few studies to address this question, Sticht (1975) found a low correlation (.30 to .40) between reading ability

and on-the-job performance tests, In order to determine the real importanct of "functional literacy" it appears necessary to take into account important attitudinal and behavioral characteristics.

A number of important philosophical and theoretical issues are involved, then, in the assessment of functional literacy. One approach to addressing these issues is to examine how individuals interact with, and how successfully they deal with, literacy demands that they actually encounter. By examining this interaction in one sphere--in a job setting--it is possible to assess components of literacy competency without reference to the symbolic aspects of literacy, or the need to establish a binary classification system. Additionally, such a study is capable of examining literacy at levels other than the minimum, of representing literacy as continuously distributed, and of examining the impact of attitudinal and behavioral influences on literacy ability in a given situation..

Status of the Problem

There are several major areas of research concerned with functional literacy. First, there has been much recent research attempting to assess the extent of functional illiteracy in the U.S. Second, there have been status reports on the state of general reading achievement in the U.S. Third, there has been some research into the changing demands of literacy in the society; any change in literacy demands would obviously affect the levels of functional literacy.

Perhaps the most-quoted study that assessed the level of functional literacy is the Adult Performance Level Project (APL) conducted by Northcutt and others (1975). APL used a number of methods, including interviews, reviews of research, and expert opinion in arriving at a series of tasks that could be called necessary for functional competence. Test items were constructed using these tasks; only tasks that were positively correlated with three measures of success--education, job status, and income--were included in the final test instruments. The criteria for passing the

tasks were based on whether scores fell into the range of scores of "Proficient adults" (APL3), "Functional adults" (APL2) or "Adults who function with difficulty" (APL1). Since these groups were also based on income, education, and job status, the results are questionable; the results can be viewed as simply supporting an untested hypothesis--that less successful people are less literate (Fisher, 1978). Although this and other factors confounded the results (Griffith and Cervero, 1977), APL provided some sense of the extent of the functional illiteracy problem. APL found that about 20 percent of the population fell into APL1 and thus could be classified as functionally illiterate. APL reported, among other things, that "44% (52 million Americans) could not match personal qulifications to job requirements listed in help wanted advertisements; 26 to 28 million were not able to address an envelope well enough to insure that it would not encounter difficulties in the postal system . . ." (Northcutt, 1975).

The Survival Literacy Study (Louis Harris and Associates, 1970), the first major assessment of functional literacy, also used representative tasks. SLS employed five application forms as the representative tasks, and set percentages of correct responses as the criterion for passing. This assessment found "that some 13 percent (18.5 million) of American adults failed to fill out the application forms for basic needs such as social security with fewer than 10% errors while 3% (4.3 million) of American adults failed the items."

The Adult Functional Reading Study (Murphy, 1975) was preceded by a survey to determine what Americans read (Sharon, 1973). This survey was used in determining tasks that could be considered "representative." Additionally, input was sought from representatives of industry, education, journalism, and consumer groups. The tasks that were chosen were administered to about 8,000 adults. Because of the difficulty in setting meaningful passing criteria, the results were reported on an item-by-item basis. Murphy concluded that "simple reading tasks based on day-to-day reading activities can be answered correctly by most adults. However, there are

significant differences between groups of adults." He also concluded that "reading materials at work is a critical part of the domain [of reading activities]. A relatively large number of people perform such tasks for a relatively long time and consider them highly important" (Murphy, 1975).

The Mini-Assessment of Functional Literacy (MAFL, Gadway and Wilson, 1974), conducted by the National Assessment of Educational Progress, used test items that had previously been used on the 1971 assessment. Specifically, items were chosen that represented typical reading formats and called for typical reading behaviors. Comparisons were made between the scores on the 1971 and 1974 samples, using three methods of scoring. Although the items chosen for the MAFL were not as representative as those used in other studies, the MAFL had the advantage of being able to make a comparison across time. Results indicated that all groups gained in functional literacy between 1971 and 1974, with a national gain of 2 percentage points.

Project REALISTIC (Sticht; Sticht et al., 1971; 1972; 1975; 1977; 1978) examined functional literacy in the context of several military jobs felt to have identical civilian counterparts. Using measures of readability, reading proficiency, and job proficiency, Sticht attempted to determine what reading level was needed to perform adequately on particular jobs--namely, cooks, vehicle repairmen, supply clerks, and armor crewmen. Reading, listening and arithmetic skills were compared to performance on job-knowledge tests, job-sample tests, and supervisor ratings. Additionally, methods of categorizing literacy demands, and assessing the difficulty of job-related reading materials were developed for this project. These studies indicated that the difficulty level of job materials and the level of the reader's skill combine to influence the extent of usage of reading materials. Sticht et al. also found that those individuals who did not use job reading materials did not necessarily compensate for the loss of information by seeking it in other ways (such as asking a fellow worker). Despite this fact, Sticht et al. reported a low correlation (.30 to .40) between reading ability and on-the-job performance as

measured by job-sample tests and supervisor ratings. The implication is that other important variables have more influence on job performance than ability to read job materials. Sticht et al. also reported that the majority of reading tasks encountered were an integral part of the job task; reading materials on the job, unlike in schools, were used primarily to do something else, and not to learn new information. While difficulties arose using the various measures, the idea of examining the actual reading materials of individuals, and their abilities to handle the material, is a most promising one for meaningful assessments of functional literacy.

In summary, assessments of functional literacy, because they relied on representative tasks and somewhat arbitrary passing criteria have yielded vastly differing results. These assessments have reported that anywhere from 2 to 20 percent of the population is "functionally illiterate." Research, such as that conducted by Sticht, which examines actual demands and competencies of individuals rather than representative demands, may hold promise for more accurately understanding and assessing functional literacy.

Additionally, some research has indicated that basic reading ability has been improving in America (Gadway and Wilson, 1974; Farr, Fay and Negley, 1978; cf. Fisher, 1978). This research indicates that progress is being made and that reports of large numbers of functional illiterates may either be inaccurate, or may indicate that basic literacy ability is not sufficient to meet functional reading demands.

Much expert opinion (but little research) has been given on whether reading demands are increasing or decreasing in the society (Levin, 1975; Cook, 1977; Newman, 1978). This issue is important in understanding functional literacy, and in meaningfully projecting the future status of functional literacy so that programs can accurately address the issue. Base-line data is needed for later comparisons if we are to determine the increase or decrease in functional literacy demands.

Determining the Difficulty of Job Literacy Materials and Ability of Readers

One aspect of this study involves the determination of the literacy demands imposed on workers in varying occupations. Although some work has been done in this area with job materials (Williams, Siegel and Burkett, 1974; Caylor et al., 1973; Smith, 1973), most research in determining the difficulty of literacy materials has been done with school materials.

The most common approach to determining the literacy demands of a situation is to determine the readability level of the materials. Much of the research in readability, and the construction of readability formulas, can be traced to an 1852 discussion of the topic by Herbert Spencer (Harris and Jacobson, 1979). Sentence length, syllable length, familiarity of words and word length were all mentioned by Spencer as affecting readability and have formed the basis for most readability formulas.

FORCAST Formula

While much research and development has occurred with readability formulas applied to school texts, little has been done to investigate the use of readability formulas in job settings. Caylor et al. (1973) applied the different structural properties underlying readability formulas to analyzing job materials in military settings. By matching reading levels of men on the U.S. Air Force Reading test and cloze scores on passages with grade equivalency levels for the passages based on readability formulas, Caylor et al. were able to examine the relative usefulness of the structural properties in determining the reading difficulty of job materials. Based on their analyses, they concluded that the number of one-syllable words per 150 word passage was as reliable an indication of reading difficulty of materials as any of the other structural properties. One explanation for this is that technical terminology is usually not mono-syllabic.

Workers would probably be familiar with the technical terminology. Other readability measures, by counting numbers of letters, number of difficult words, or numbers of polysyllabic words, would tend to measure the technical vocabulary as more difficult than it is to an experienced worker. Thus, Caylor et al.'s formula (the FORCAST) may be more appropriate for job materials by accounting for worker knowledge of technical terms. In fact, Caylor et al. report high intercorrelations between the FORCAST and other formulas (with Flesch, r = .92; with Dale-Chall, r = .94) and with reading grade levels based on the USAF reading test (r = .87). The FORCAST formula has been used in the military to determine reading difficulty of materials (Sticht, 1970, 1975; Mockovak, 1974).

Cloze Testing

The method of determining reading ability used in this study was the cloze procedure. In the cloze procedure every fifth (or nth) word is deleted and the subject supplies the missing word. Reading ability is determined (or estimated) by the number of missing words that are correctly replaced (Bormuth, 1962). Cloze has consistently yielded high correlations with multiple-choice comprehension tests (Taylor, 1953; Bormuth, 1969; Rankin and Culhane, 1969). In examining job literacy, Caylor et al. (1971), using a cloze criterion score of 35% correct, found cloze results and results from the Air Force reading test and from Job Reading Tasks Tests to be highly correlated (r = .83, r = .65 to .80 respectively). In examining the results of job literacy testing, Sticht concluded, "the cloze test provides at least as valid a measure as the typical multiple-choice test" (1975, p. 23).

Cloze tests are used in this study to examine the ability of subjects. In addition to the support given in the research, cloze was chosen for three other reasons: 1) the ease of construction and grading make this measure most appropriate when a different test is being designed for each person; it is felt that

the construction of a multiple choice test would be too subjective and difficult to accomplish, especially for unfamiliar occupations; 2) only a few measures of comprehension and ability could be designed for short passages using other methods; cloze, on the other hand, would provide 30 possible answers and thus would provide a better measure of comprehension; and 3) grading can remain consistent across materials and is not dependent on familiarity of the test constructor with job-related information.

Cloze tests have been criticized for primarily measuring a reader's ability to utilize syntactic redundancy in texts (Weaver and Kingston, 1963; Carroll, 1972). Horten (1973) conducted a validity study of cloze using factor analysis and concluded that it did measure the ability to deal with semantic relationship and implications--constructs often associated with comprehension. Bormuth (1969, 1975) concluded that cloze is a valid measure of literal comprehension and constructed a regression equation and charts for converting cloze scores to grade equivalency comprehension scores (this formula is used in the present study). Bormuth recommends the use of more than one cloze test to measure comprehension, and in as much as this study only uses one for general reading comprehension and one for job comprehension, the results must be viewed as rough estimates of ability.

Occupational Success

Assessing occupational success across a wide diversity of occupations is a difficulty that has traditionally stymied measurement specialists. Competency tests and rating scales for individual occupations have been developed with some degree of success. It has generally been true that the longer and the more detailed the competency assessment, the more valid and acceptable the results. Supervisor ratings have traditionally not correlated very highly with the ratings of other supervisors or with more objective criteria for job competence.

The task of assessing competence equally across over one hundred individuals

from nearly as many occupations becomes insurmountable without an enormous expenditure of resources. For this reason, the researchers elected to forego assessing job competence. Instead, three traditional measures of occupational success were included in the study. These measures are job status or prestige, income, and the degree of responsibility present in the job.

Nearly every ranking of job status over the past three decades has been based upon the 1947 National Opinion Research Center (NORC) study in which a representative sample of the American public was asked to rank ninety occupations according to their prestige. Replications of the study (Hodge, Siegel, and Rosse, 1966) have indicated correlations of r = .99 over two decades and Yankelovich (1979) indicates the NORC status rankings are still widely accepted by social scientists.

In addition to status, income and responsibility are used in this study as indications of occupational success. While income is easy to measure, responsibility is not. Some researchers have used number of subordinates as a measure of responsibility (Reiss, 1961). More commonly, task analyses of jobs are interpreted to indicate the relative responsibility of a job. The Dictionary of Occupational Titles (Department of Labor, 1977) gives responsibility rankings to thousands of specific occupations based on task analyses of the occupations. Detailed task analyses of occupations are also published by Ohio State University (Analysis of Occupations Series, 1973), and by the Department of Labor in the Occupational Outlook Handbook (1978-79). The Dictionary of Occupational Titles (DOT), however, provides the most comprehensive and accessible indications of job responsibility.

In the DOT, each occupation is given a number based on the job level and title and on the responsibility of the job. Three digits are assigned to describe responsibility. The first digit describes the responsibility of the job towards handling data, the second digit describes responsibility in handling people and

the third digit in handling things. Each digit describes job responsibilities going from simple to complex; thus, the digit describing responsibility towards data covers such tasks as copying, compiling, analyzing and synthesizing data. As examples, the occupation "manager-personnel" is ranked "coordinating" (1) for responsibility with data and "negotiating" (1) for responsibility with people; the occupation "parachute-rigger" is ranked "comparing" (6) and "taking instructions" (8), for data and people responsibility respectively. These rankings can be used as indications of the overall responsibility of a job; thus, "manager-personnel" has a responsibility rank of 2 (1 + 1) and "parachute-rigger" has a rank of 14 (6 + 8). (See Appendix B for a listing of the tasks described by the DOT number). The DOT classification system lends itself well to this type of study, where a relative indication of the responsibility of particular occupations is desired.

Research in occupational success variables indicates that success is both subjective (e.g., in terms of prestige) and objective (e.g., in terms of income) and probably should be measured along several dimensions. This study uses traditional and tested scales (the NORC for status, DOT rankings for responsibility, and actual income) to measure success, recognizing that these provide only a relative and approximate indication of occupational success.

Attitudinal Variables

The researchers speculated that subject attitudes toward reading in general and their own jobs in specific might have a substantial influence upon a subject's "job literacy." Though there are several studies on the relationship of reading ability and attitude in schools (Matthewson, 1976; Mikulecky, 1978) and a number of studies of adult reading habits and attitudes (Link and Hopf, 1975; Sharon, 1973; Mikulecky et al. 1979) very little research exists on either adult job reading or its relationship to attitudinal variables.

Two studies do examine job-related reading in part. Sharon (1973), in a major study for the Educational Testing Service involving 5,067 randomly selected adults, reported that 33 percent of the sample read at work (out of 38% of adults working on a typical day), that job-related reading was viewed as highly important, and that the people who read at work tended to be from a higher socio-economic level. Mikulecky et al. (1979) surveyed the attitudes, habits and motivations of 284 randomly selected subjects from Anderson, Indiana, a town similar to the nation in demographic variables. They found that the mean number of minutes on job-related reading per day was 73. (Sharon reported a median of 61 minutes.) Mikulecky et al. reported significant differences in job reading time for employment level and education-completed variables. Mikulecky et al. also found that most subjects felt comfortable with job reading demands; 11.6 percent of the respondents reported some discomfort with these demands. Men tended to go to printed materials for information about problems on the job; this was not true, however, for the group of subjects with less than a high school education. Women tended to go to job material less than men to ($p < .05$).

Reader habit (in terms of what is read and how much is read) has been the major variable examined in most of the studies concerned with adult reading attitudes. While habit may be viewed as an indication of attitude, it is not a measure of attitude. The study by Mikulecky et al. was the only study to include an examination of reading attitude per se and relate it to reading motivations and habits. It found significant differences in reading attitude scores between men and women (with women scoring higher), and between income levels (with those earning over $20,000 a year scoring higher).

Little research exists investigating the effect of adult reading attitudes or habits on ability. To the extent that attitude affects ability (or performance), attitude may be an important variable in determining functional literacy

ability. Murphy (1973), for example, in reporting the results of the ETS functional literacy study, indicated that a major drawback to the study was that it did not take into account important attitudinal variables. This study attempts to examine attitudinal variables and relate them to functional literacy.

Method

In order to answer some of the basic questions posited by previous research, 107 working adults from a range of occupations that reflect the occupations listed in the Dictionary of Occupational Titles were interviewed and assessed in relation to job literacy strategies, demands, and attitudes. Results of these interviews were analyzed to determine (1) job literacy profiles for various occupational levels, (2) significant differences between occupational groups, and (3) the relationships between literacy demands, abilities, strategies and attitudes.

Sample

A random selection procedure was used in order to get subjects from a wide variety of occupations and workplaces. Although the workplaces were randomly selected, it is unclear whether the individuals within workplaces were also randomly selected, and thus it should be noted that a true random selection may not exist in this sample.

Initially, Chamber of Commerce directories were obtained from cities and large towns within a 60-mile radius of Bloomington, Indiana. Directories came from Bloomington, Bedford, Martinsville, Columbus and Indianapolis; in all cases, directories included some workplaces outside the actual town or city (e.g., Hope). Quotas for number of businesses and industries to be interviewed in each town were set, based primarily on the population of the towns. Since interviews could only be set up with the cooperation of the workplaces, these quotas served as targets and were not completely met. The cities, quotas, and actual number of workplaces involved are listed in Table 1.

TABLE 1
Workplaces Participating, by City

City	Quota	Number Involved	Population
Indianapolis	15	9	782,139*
Bloomington	5	5	48,955*
Columbus	5	3	27,468*
Martinsville	4	4	10,551*
Bedford	4	4	14,429*
Hope	-	1	under 2,500*
TOTAL	33	26	

*From U.S. Bureau of Census, County and City Data, 1977. pp. 833-35

Each business or industry in each Chamber of Commerce directory was assigned a number (sequentially). A Table of Random Numbers (Glass and Stanley, 1970, pp. 509-512) was used to select workplaces. Initially, the number of workplaces needed to meet each city's quota was chosen and letters were written to the thirty-three resultant workplaces asking for their cooperation. The letters were followed one week later by telephone calls. In most cases, several phone calls were needed to get a response. Workplaces unable to cooperate were then replaced by another workplace from the same city, selected randomly, and a letter was sent to the new workplace. When the individual in charge (contact person) indicated that a workplace could be used for collecting data, the individual was then fully informed about the study and asked to arrange a specific time when interviews could be conducted. Full information about the numbers and types of employees in the workplace was requested, and the contact person was asked to randomly select one person from each level of occupation in the workplace to be interviewed. In cases where that was not possible (e.g., where there were dozens of occupations respresented), the contact person was asked to randomly select workers to be interviewed.

One hundred seven subjects participated in the study. Subjects ranged in occupation from fast-food cooks and machine operators to vice-presidents of large companies and a laywer. Complete job descriptions were obtained from each subject and later matched with descriptions in the Dictionary of Occupational Titles.

Table 2 summarizes the broad DOT occupational categories represented in the study sample, and compares the sample against the national employment pattern.

As can be seen from the table, the sample for this study is reasonably representative with two exceptions: service occupations are under-represented

TABLE 2
Comparison of Occupational Levels in Sample to National Employment Pattern

Number/DOT First Digit	Occupational Category	Percent in Sample		Percent Empl'd Nationally	
0/1	Professional, technical, managerial	31.8		26.7*	
2	Clerical and sales	30.8		25.0*	
3	Service occupations	4.7		12.3*	
4	Agricultural, fishery, forestry and related	0.0		3.6*	
5	Processing	1.9	32.7	32.4*	
6	Machine trades	17.8			
7	Benchwork	3.7		"Blue-collar"[1]	
8	Structural work	3.7			
9	Miscellaneous	5.6			

*Statistical Abstract of the U.S., 1976. p. 373; 1975 census data.
[1]Census information does not differentiate among the sub-categories of "blue-collar" workers.

and agricultural occupations are not represented at all. The lack of agricultural, fishery or forestry workers can be seen as a result of the sampling procedure--such occupations tend to be self-employed occupations and do not turn up in Chamber of Commerce directories.

Additional comparisons of this sample with the adult, employed population of the U.S. indicates that the sample is seemingly representative on several demographic variables. The following table summarizes this comparison:

TABLE 3
Comparison of Sex, Race and Schooling Percentages: Sample and National Figures

Variable	Percent in Sample	Percent in Population of Working Adults
Sex		
Male	64.8	60.6*
Female	35.2	39.4*
Race		
White	82.9	88.5**
Black	15.2	11.5**
Hispanic	1.9	(included in white)
Schooling Completed		
Less than high school	19.2	34.1***
High school/GED	23.2	20.4 (not inc. GED)***
Some post high school	30.3[1]	29.8***
College	19.2	15.1 (college and post-college)***
Post College	8.1	(these figures for total adult population)

*Statistical Abstract of the U.S., 1976, p. 356.
**Ibid, p. 355.
***U.S. Bureau of the Census, Current Population Reports, 60, No. 118, 1979, p. 87.
[1]Includes trade school, business-run training, etc. In many cases, should be grouped with "high school" for comparison purposes.

As the above table indicates, the sample is representative in terms of race and sex. The sample is somewhat better educated than the American adult population, with a lower percentage of subjects in the category of not having completed high school, and a higher percentage having completed college. This over-representation of higher educational levels may be due to the sampling procedure (i.e., better qualified workers were chosen by contact persons to be interviewed) or it may be due to the fact that only full-time employed individuals were interviewed. Assuming that people with lower educational attainments tend to be over-represented in the unemployed and part-time employed categories, it may be reasonable to expect such higher levels of educational attainment in a sample of all full-time employed.

An additional comparison of this sample with the adult population can be made by comparing scores on items used in this survey and in the 1977-78 Spencer study in Anderson, Indiana. As noted earlier, the Anderson sample was demographically representative of the nation (Mikulecky, Shanklin and Caverly, 1979) and thus scores on items using the Anderson sample should be indicative of scores one might expect nation-wide. Table 4 compares the means and standard deviations between the Anderson sample and this sample on those variables used in both studies.

An examination of the comparison between the Anderson sample and the current sample reveals the two to be approximately equal in total reading attitude and in intensity of motivation for reading. It is interesting to note that the current sample reports far more job-related reading. If the additional job-related reading time were partialled out, the time spent reading overall would be about equivalent across samples. Clearly, the only difference exists in amount of job reading time reported; because this study is concerned with job literacy, it is possible that subjects considered the amount of job reading done and gave more accurate answers; it is also possible subjects gave inflated figures.

TABLE 4
Comparison Between Anderson and Job Literacy Samples on Items Used in Both Studies

Item/Variable	Anderson Sample*		Job Literacy Sample	
	Mean	Stan. Dev.	Mean	Stan. Dev.
Score on Mikulecky Behavioral Reading Attitude Measure	68.4	15.8	67.6	16.7
Score on "Intensity of Motivation for Reading (see explanation, p. 92)	19.1	3.6	19.4	3.8
Time spent reading for job per day	86.2	108.0	112.6	119.4
Time spent reading overall per day	157.1	126.9	195.3	140.4

*Mikulecky, Shanklin and Caverly, 1979; means and standard deviations reported for full-time workers only.

Overall, in terms of sex, race, income, occupational category, reading attitude, intensity of motivation for reading, and general reading time, this sample seems to reflect the adult, working population. The sample may be better educated, and may read more on the job than the adult population, but it is unclear if these differences are due to sampling problems. The differences in educational attainment may be due to the fact that only full-time workers were interviewed and they tend to be better educated than the general population; the differences in job reading time may be due to the expectancies of the subjects which led them either to answer more carefully, or to inflate estimates. Despite these two differences, the sample is reasonably representative; more importantly, the sample clearly represents a good range of occupational levels and types.

Diehl-Mikulecky Job Literacy Survey

The data gathering instrument used in this research assesses three basic areas of job literacy. These areas are Literacy Demands, Literacy Strategies, and Attitudinal/Behavioral Dispositions Related to Literacy. Items are drawn from previous work by Sticht et al., 1972, 1975, 1976, 1978; Smith, 1973; O'Toole et al., 1973; and Mikulecky, Shanklin, and Caverly, 1979. In addition, several demographic items were also included in the survey. The complete survey can be found in Appendix A and a full disucssion of the item analysis and variable construction can be found in Diehl, 1979.

One hundred eighty-four bits of data are collected for each subject. Missing data are reported and discussed. The data are reduced to twenty-one variables to be used in the analyses of hypotheses. Eighty-four items are used to generate job literacy profiles for each subject and for each occupational level, and to describe the literacy demands encountered by the entire sample.

Variables and an explanation of their constituent parts follow below:

Literacy Demands

-- Difficulty of materials (readability levels of job materials using FORCAST; self-assessed difficulty)

-- Reading/writing scope (measure of the variety of literacy tasks encountered on a job; consists of the number of types of reading and writing materials cited and an analysis of five specific reading and writing tasks, to determine the range of types of literacy demands encountered)

-- Reading/writing depth (measure of the complexity of literacy tasks encountered ranging from skimming for one piece of information to employing complex study strategies in a reading-to-learn task)

-- Amount of time reading job materials per day

Literacy Competency and Strategies

-- General reading ability (assessed through the use of a cloze test on a

general topic; test had a readability level of 10.6, using Bormuth's (1975) cloze readability formula with a criterion score of 35%; test also validated through comparison with scores on the Nelson-Denny reading test, Form A, using 85 university freshmen; $r = .804$; $p < .01$)

-- Job reading ability (assessed through the use of a cloze test constructed from job materials used by subjects)

-- Number of strategies used in completing literacy tasks (each strategy used was ranked by subjects as to frequency of use; "number of strategies used" is the sum total of these rankings)

-- Variety of strategy type used (the total number of strategies used by subject). "Variety of strategy type" measured by: total number of different graphic displays used (e.g., "part of book, text," "one to three page chart, graph or table," "form to fill out") plus the total number of different general strategies used (e.g., "reading-to-learn," reading-to-assess") plus the total number of different specific strategies used (e.g., "relate/associate," "fact-finding in text"). See the survey form Appendix A; items 2.1-3.3 were recoded to yield these figures.

-- Use of alternative strategies (i.e., asking a fellow worker for information, etc.)

Attitudinal/Behavioral Dispositions Related to Literacy

-- Generalized reading attitude (score on the Mikulecky Behavioral Reading Attitude Measure, Mikulecky, 1976)

-- Attitude towards the job (sum of Likert-type responses on interest in the job, comfort with the job, desire to change occupations)

-- Job experience (originally included number of years on the job, self-perceived ability, and supervisor or interviewer rating; only number of years on the job used in final analysis

-- Time spent reading overall, per day

-- Reading interest (variety of motivations for reading)

-- Job reading interest (including comfort with the literacy demands of the job; self-assessed job literacy ability)

Interviewer Training

Five interviewers participated in this study. One interviewer conducted two interviews and one conducted only one; the majority of the interviews were conducted by three interviewers. Interviewer 1 conducted forty-nine interviews; Interviewer 2, twenty-two; and Interviewer 3, thirty-nine.

All interviewers participated in two one-hour training sessions. The three main interviewers then field-tested the survey on two individuals apiece. During the course of the study, data collection was monitored. Completed surveys were checked by the chief researcher to ensure that all information was collected and coded properly. In cases where the interviewer was unsure about how to code a response, the response was written out and later coded after consensus with a second interviewer had been reached.

Data Acquisition

The data were collected at the workplaces of the interviewees. Conference rooms were generally set aside by the employers, and the subject met there with the interviewer. In some cases, the subject and interviewer also went to the actual work area of the subject either to clarify a particular point the subject had made or to look at the literacy materials or job tasks. Interviews took approximately one hour; some were as short as 35 minutes and some as long as an hour and a half.

Hypotheses and Means of Analysis

As discussed earlier, data collected are used to generate profiles of

literacy demands and strategies in different occupations. In addition to this descriptive use, data are analyzed to test specific hypotheses. The hypotheses, and means of analysis, follow. Null hypotheses are stated in the results section.

Working Hypothesis One:

Job literacy demands are related to the level of occupational success. Higher level occupations have higher literacy demands. Job literacy demands are measured by five factors:

-- Scope of literacy demands
-- Depth of literacy demands
-- Reading difficulty of materials
-- Amount of time spent per day on the job reading
-- Variety of strategies needed (used) in meeting demands

Level of occupational success is measured by four factors:

-- Income
-- Job status
-- Responsibility of the job (as rated by the Dictionary of Occupational Titles)
-- Occupational group (as rated by the Dictionary of Occupational Titles)

Rationale: It has been suggested that the distribution of literacy and literacy demands in our society roughly conforms to the distribution of economic and social rewards (Fudge, 1973; Sennett and Cobb, 1973). This notion suggests that schools play a vital role in tracking students into appropriate places in what amounts to be a meritocracy. The argument that has been forwarded is that higher level jobs (with more income, status and responsibility) require more ability; one of the roles of the school in the society is to help ensure that those students with "merit" end up in the higher level jobs and those students with "less merit" end up in lower level (e.g., blue collar) jobs. There has been research supporting the idea that schools may, in fact, track students towards higher or lower level jobs, based primarily on the SES of

of the student (see, for example, Hollingshead, 1949; Violas, 1978; Karabel, 1972).

The question this hypothesis attempts to address is whether, in fact, higher level jobs do require more literacy ability by having heavier literacy demands. If higher level jobs do require more literacy ability, this would support the idea that the distribution of literacy (as one form of ability) does and perhaps should roughly conform to the distribution of rewards. On the other hand, if higher level jobs do not require more literacy ability, this would suggest that, in terms of job literacy, the meritocratic view of society and schooling may be incorrect. Such a result would add credence to the idea that students are tracked, not because the demands of the workplace warrant it, but possibly because of an ingrained social structure maintained and carried to the next generation by schools.

This hypothesis also addresses the question of what types of literacy abilities may be required for upward-mobility. By determining differences in demands among occupational levels, it may be possible to identify abilities necessary (or important) for advancement.

Analysis: Analysis of variance is computed for each of the four indicators of occupational success. Student t tests are used to determine the significance of differences between occupational success groups on each of the measures of job literacy demands. If, in calculating the student t's, the F test of the sample variances indicates that the groups have significantly different ($p < .05$) variances, the t based on separate variance estimates is used. Otherwise, t based on pooled variance is used. Significance for both the ANOVA and Student t tests are set at the .05 level.

The relative contributions of measures of occupational success (status, income, and job responsibility) to explaining the variance in job literacy

demands is examined using multiple regression analysis. Scope, depth, difficulty, time, and variety of strategies are each used in separate regression analyses as dependent variables, and the three measures of occupational success are entered in an hierarchical solution, with the inclusion ordering based on the simple correlations between variables.

Working Hypothesis Two:

Job literacy competency is related to factors other than general reading ability and literacy demands of the job; job literacy competency is also highly related to length of time on the job, general reading attitude, job reading interest, and attitude towards the job.

Job literacy competency is measured by the grade equivalency score on the job cloze test. Since only 35 subjects completed a job cloze test, a second measure of job literacy competency is also used. This second measure is the reading difficulty of materials subjects said they had to read on the job; it is assumed that since subjects had to read the materials, they are able to read them and thus the reading difficulty of materials gives some indication of job reading ability. All analyses in this hypothesis are computed twice--once using job cloze equivalency scores and once using difficulty of materials as dependent variables.

Rationale: Traditionally, when a person applies for a job, his/her qualifications are matched against the job demands. In terms of job literacy, then, the reading ability of the applicant are matched against the reading demands of the job, and a determination is made on whether the applicant can handle the demands. Sometimes, applicants take standardized reading tests, or job-related tests that measure aspects of reading, and the results are matched against an estimation of the difficulty of materials and/or the scores achieved by job incumbents on the same test. While a number of other types of assessment are done, this matching of reading ability to reading demands seems to be a traditional

one for occupations requiring a degree for literacy. (See Mikulecky and Diehl, 1979 for complete review of literacy testing in workplaces.)

This investigation hypothesizes that other factors influence functional literacy ability. This hypothesis attempts to determine if the length of time a worker has been on the job, and his/her attitudes can be helpful in determining the functional literacy ability of a worker. If these variables are significant in explaining job literacy ability, such a result would seriously question the usefulness of only comparing general reading ability with job reading demands in making a personnel selection decision. Such a result would indicate that attitudes and job experience should also be taken into account, as they will contribute to functional literacy ability on the job.

On the other hand, if the attitude variables and job experience do not contribute to explaining job literacy ability, and if general reading ability does contribute significantly, this would indicate that the traditional selection procedure outlined above may, in fact, be appropriate. Such a result would at least indicate that general reading ability is a more powerful predictor of job reading ability than are attitude measures and job experience.

Analysis: Pearson Product-Moment correlations (or Kendall's correlations, in the case of pairs involving "length of time on the job") among all pairs of variables are calculated. Significance is set at the .05 level. In order to test for the effects of attitude variables on the correlations between general reading ability (GE score on the general cloze) and job reading ability (GE score on the job cloze), partial correlations between these two variables are calculated with reading attitude, job reading interest, attitude towards the job, difficulty of material, and length of time on the job partialled out. If the resultant partial correlation between general and job reading ability is no longer significant ($p < .05$), the variable partialled out is concluded to provide an important contribution to explaining job reading ability.

Multiple regression analysis--using a combination of hierarchical and simultaneous inclusion of independent variables--is used to examine the contributions of sets of variables in explaining job literacy ability. In the first regression analysis, variable "set one" (difficulty of materials and general reading ability) is entered first, with the variables calculated among the occupational groupings. Significance for the ANOVAs and Student t's are set at the .05 level. Variable "set two" (length of time on the job, general reading attitude, job reading interest and attitude towards the job) is entered second, with the variables calculated simultaneously. This analysis indicates the contributions of set two (interest variables) to explaining job literacy competency, once set one (the match of general ability and difficulty) have been accounted for. The R^2 change from set one to set two, and the significance of the F to enter each variable (with a significance level set at .05) are used to evaluate results.

In a second regression analysis, "set two" variables are entered first, simultaneously, and "set one" variables are entered second, also simultaneously. The R^2 total for set one indicates the contribution of the "interest" variables in explaining job literacy competency, before set one variables are entered. The R^2 and significance of the F to enter or remove (with a significance level set at .05) are used to evaluate the significance of the contribution of set two variables. Additionally, a comparison of the R^2 contributions of the set two variables from the first regression analysis to this analysis indicates the degree to which the "interest variables" are associated with job literacy competency when the more traditionally used variables of general ability and job literacy difficulty are, or are not, first accounted for.

A third regression is calculated with difficulty of material (used in this case as a measure of job literacy ability) as dependent variable, and general reading ability and the four "interest" variables as independent variables.

General reading ability is entered first, then the four other variables are entered simultaneously. The R^2 change for the four "interest" variables is used to indicate the relative contribution of these variables to explaining the total variance in difficulty of materials once general reading ability is accounted for. Significance for the F of the ANOVA of the regression is set at .05.

Working Hypothesis Three:

The majority of tasks encountered on the job require reading-to-do rather than reading-to-learn or reading-to-assess strategies. Differences will appear among occupational levels, with higher levels requiring more reading-to-learn and reading-to-assess.

Rationale: In research with job literacy in the armed forces, Sticht (1977) found that most tasks are reading-to-do, and that most tasks in training and school setting within the military are reading-to-learn tasks. There may be important differences in the processing of information between these types of tasks, as Sticht suggests. The question this hypothesis first addresses is whether significantly more reading-to-do tasks than other types are done by this sample.

The second question this hypothesis addresses is whether the number of reading-to-do, reading-to-learn and reading-to-assess tasks vary significantly by occupational groupings. If higher level occupations require more highly developed literacy skills, it could be expected that higher level occupations entail more reading-to-learn and reading-to-assess tasks. Because reading-to-learn and reading-to-assess tasks are more decontextualized and require greater use of memory, they appear to be more difficult than reading-to-do tasks in which the information from the text is easily matched with information in the environment and is usually immediately applied (and not remembered). Thus, the analyses

attempt to determine if higher level occupations require the use of more complex literacy strategies than lower level occupations.

Analysis: Frequency distributions are used to illustrate differences in the number and type of strategies used. Student t tests are used to test the significance of these differences. Separate variance estimates are used if the F has a probability of less than .05; otherwise, pooled variance estimates are used.

Analysis of variance among occupational levels, using the five measures of occupational success, on the scores for strategy use are calculated. Student t tests are used to test the significance of differences.

Results: Descriptive Statistics

This section of the study presents descriptive job literacy profile results along with the results of tested hypotheses.

Profiles of Literacy Tasks Encountered on the Job

As part of this study, subjects described up to five examples of specific reading materials and five examples of specific writing tasks encountered on the job. A series of questions was used to determine the strategies used by workers in completing the literacy tasks cited, the frequency of the tasks, the perceived importance of the task, and the type of material (or graphic display) used. Results from these questions give an additional profile of the literacy demands encountered by subjects in this sample. The following ten figures illustrate the results.

Figure 1 reports the frequency of reported purposes (or general strategies) for the reading materials cited. Read-to-do tasks, in which no learning takes place, account for 40.2 percent of the tasks cited by subjects. Read-to-do tasks, with incidental learning, account for an additional 22.9 percent; 63.1 percent of the reading tasks, then, are described as a type of read-to-do task

by subjects. Read-to-assess tasks account for 25.8 percent and read-to-learn account for only 11.1 percent.

Figures 2 to 5 report the frequency with which specific strategies are reported by subjects (a complete description of these strategies is given in Appendix C). "Focus attention," for example, is the most frequently used strategy for read-to-learn tasks; fact-finding using charts is the most frequently used read-to-do, with no learning, task. Figure 6 reports the frequency of responses for types of reading materials used. A one-to-three page text was cited most frequently (30.5 percent), followed by one-to-three page charts, graphs or other graphic displays (21.1 percent). Almost half the material cited is connected discourse and a third is graphic displays; an additional 14.7 percent is "entire books" which, if added to the connected discourse total (assuming that most books, read in toto, are connected discourse) which indicate that 64.6 percent of all materials cited are of connected discourse.

Figure 7 reports the frequency of responses to the item assessing the importance of the reading material in accomplishing a job task. Over half the subjects felt the particular reading material was "important, but not vital." Only 21 percent felt the reading material was "vital" to the completion of the job task.

Figure 8 reports the frequency of response to the number of times the material is used on the job. Most reading material cited (60.6 percent) is used daily by subjects.

Figure 9 describes the type of writing tasks done on the job, and Figure 10 describes the frequency of use. As the figures indicate, filling out a prepared form is the most-cited task (42.2 percent). Most tasks are done daily (65.3 percent).

Figure 1

Types of General Strategies (or Purposes) Cited for Specific Job Materials

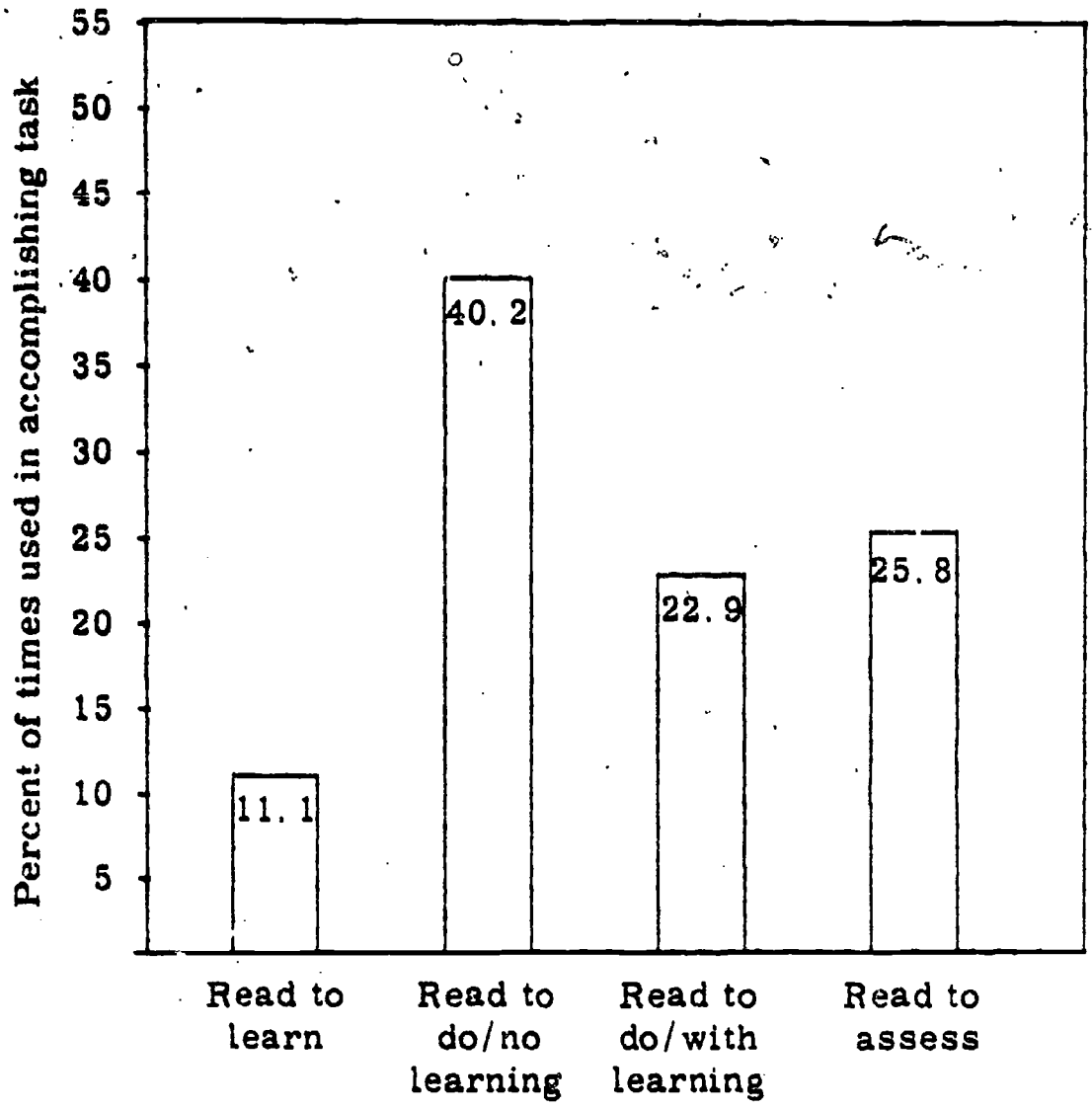


FIGURE 2
Specific Strategies Used with Job Reading Materials: Reading to Learn Types
(11.1% of materials cited)

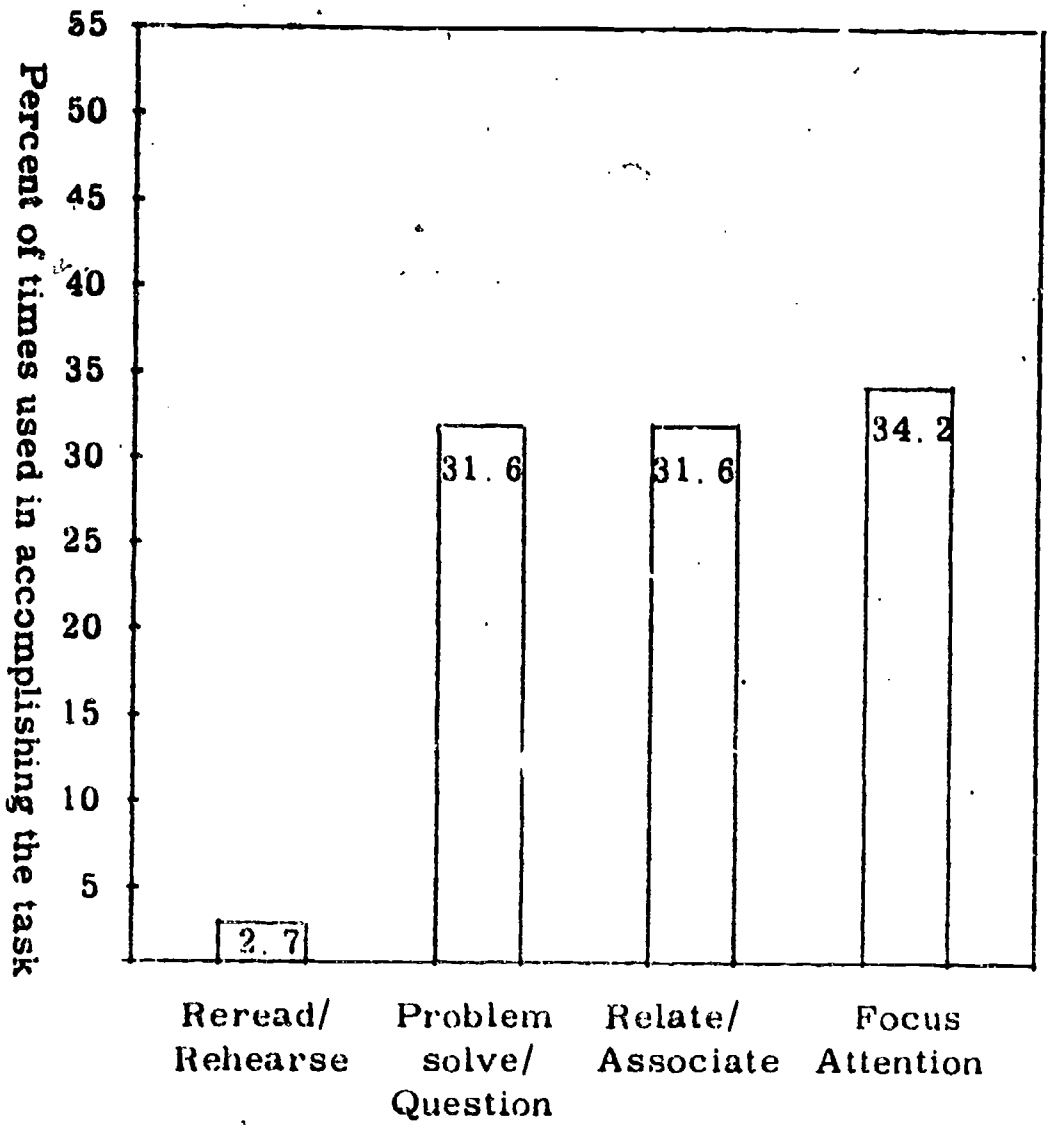


FIGURE 3
Specific Strategies Used with Job Reading Materials: Reading to Do Types with No Learning
(40.2% of materials)

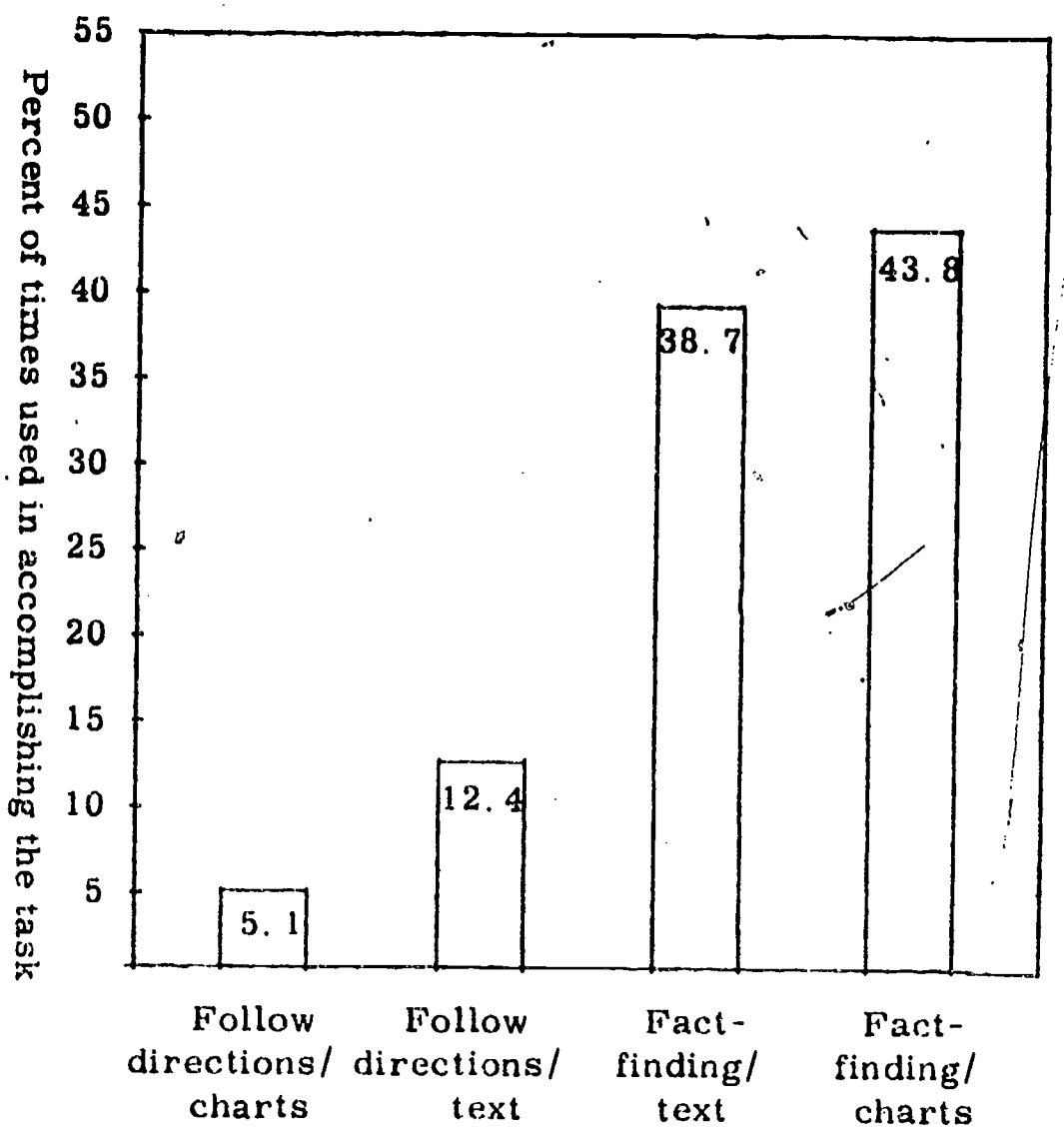


FIGURE 4

Specific Strategies Used with Job Reading Materials:
Reading to Do Types With Learning
(22.9% of materials)

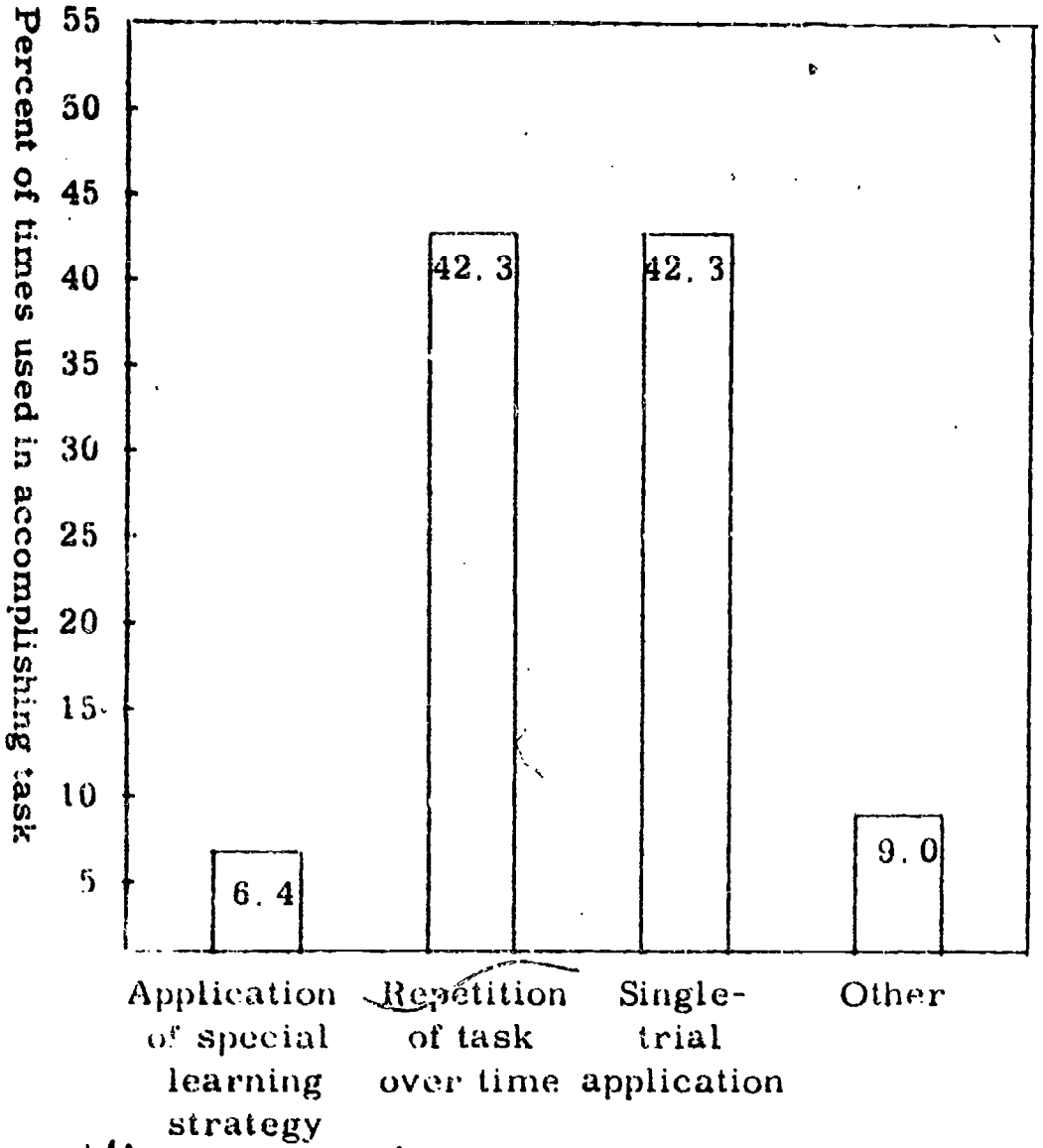


FIGURE 5

Specific Strategies Used with Job Reading Materials:
Reading to Assess Materials
(25.8% of materials cited)

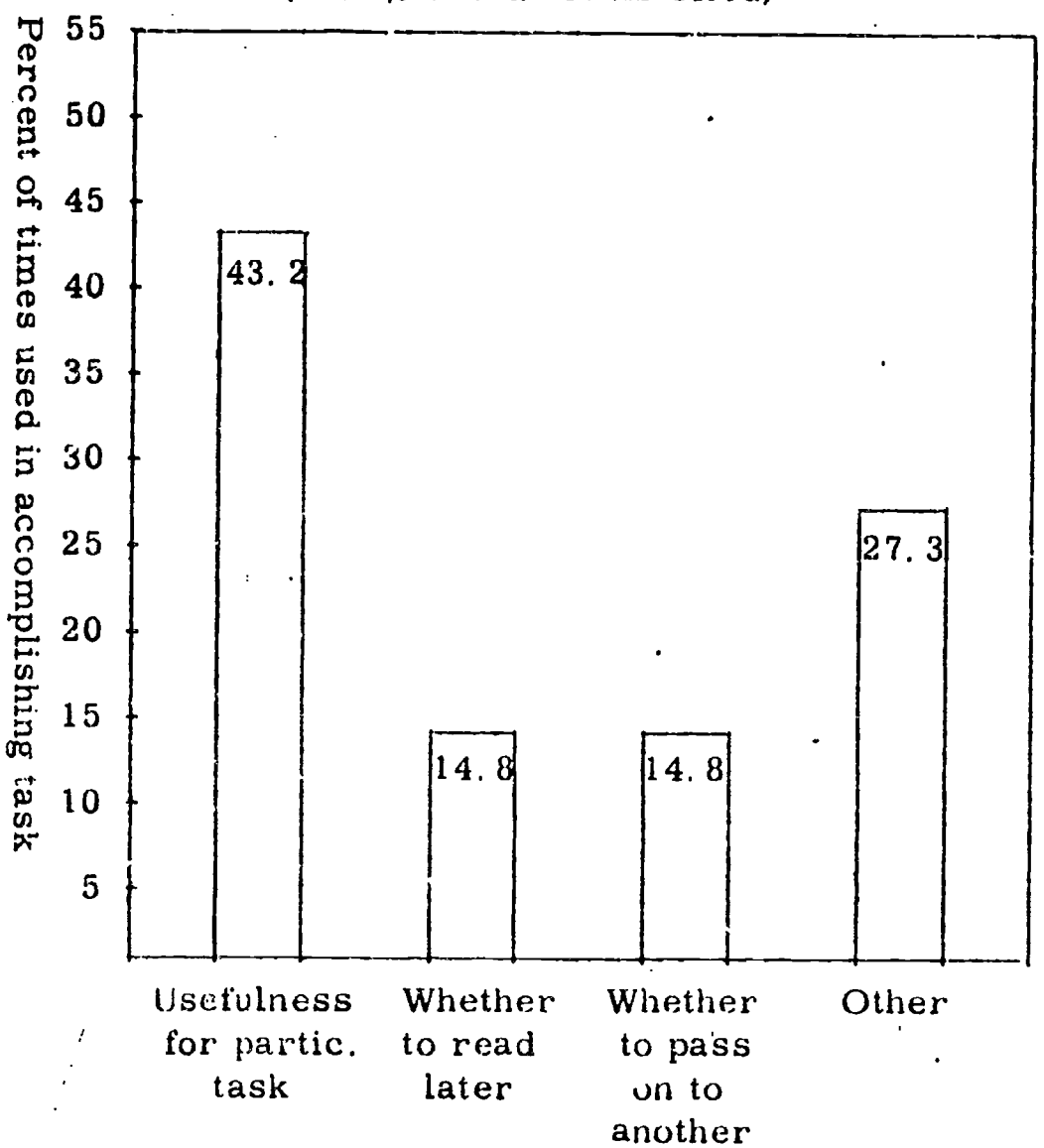


FIGURE 6
Types of Reading Done on the Job: Materials Used

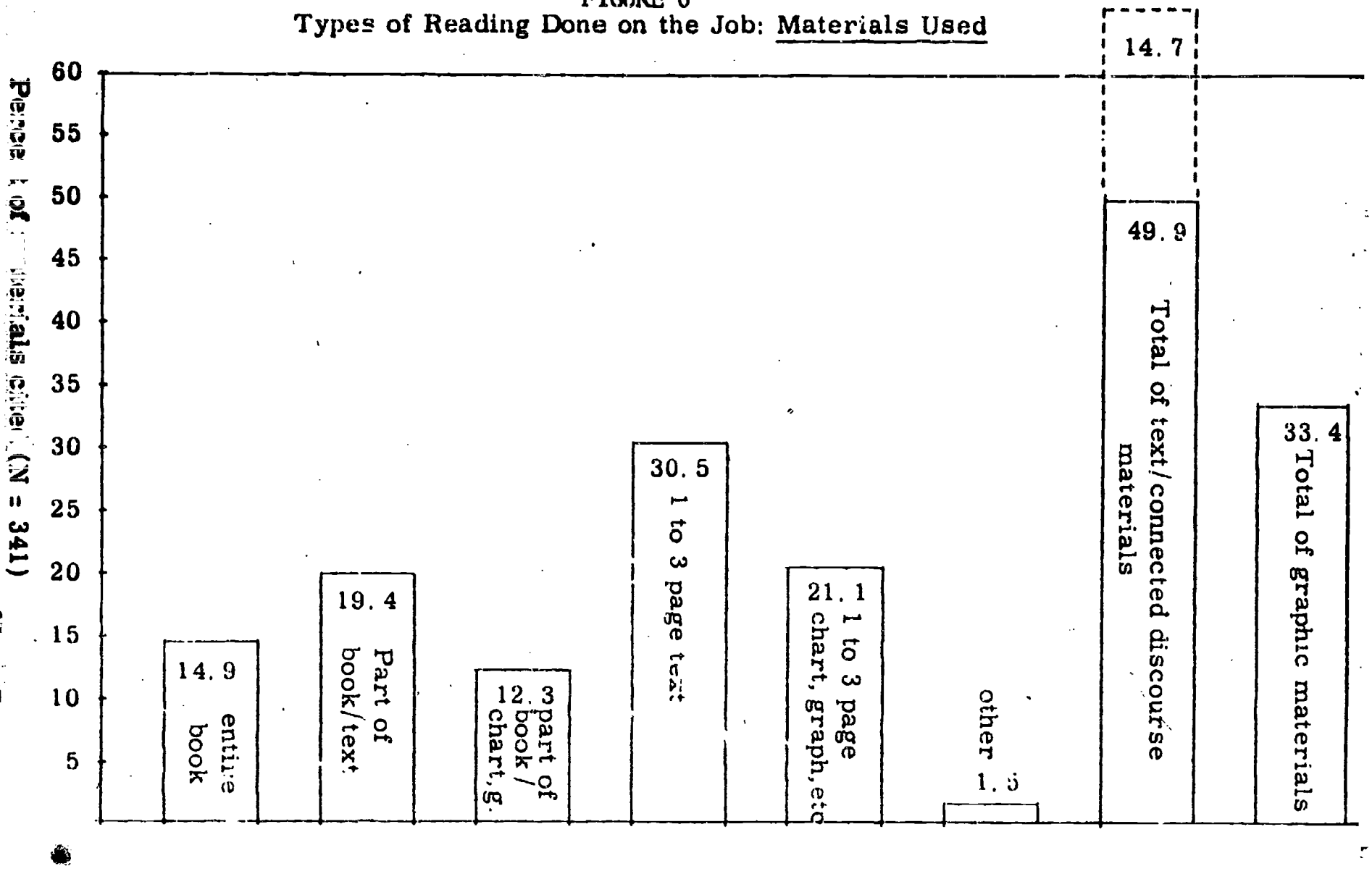


FIGURE 7
Subject-Assessed Importance of Each Piece of Reading Material in Accomplishing Task

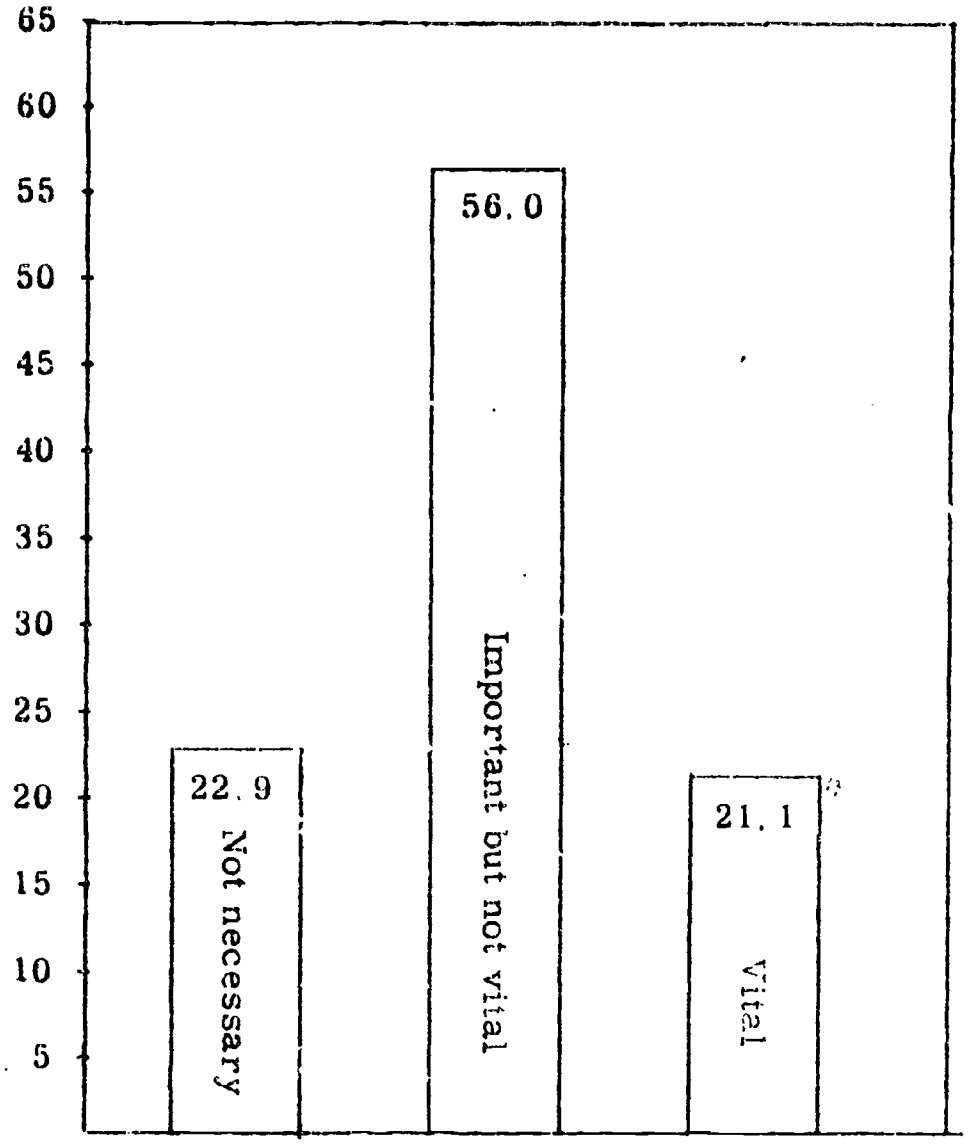


FIGURE 8
Number of Times Type of Reading Material Used on Job

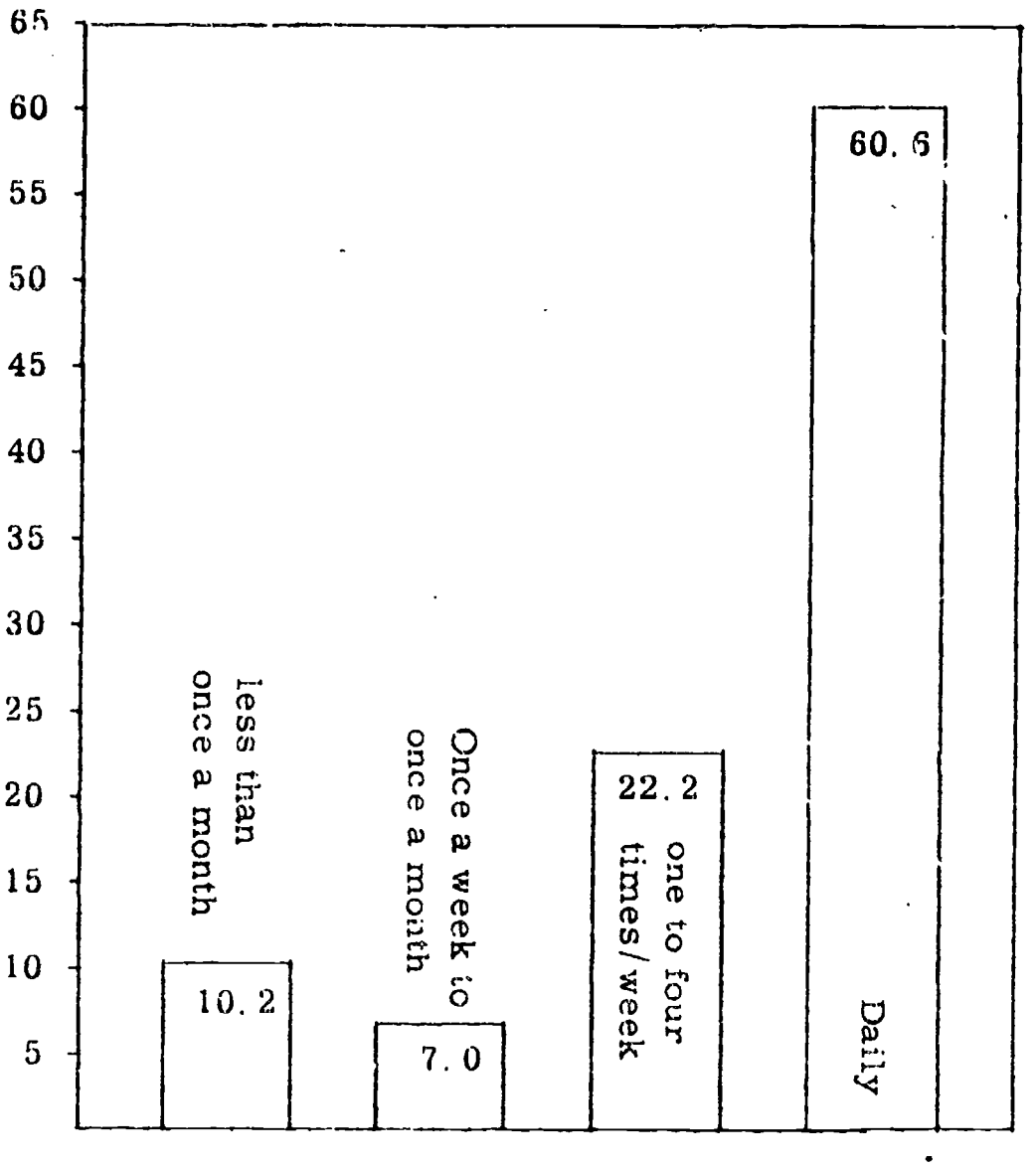
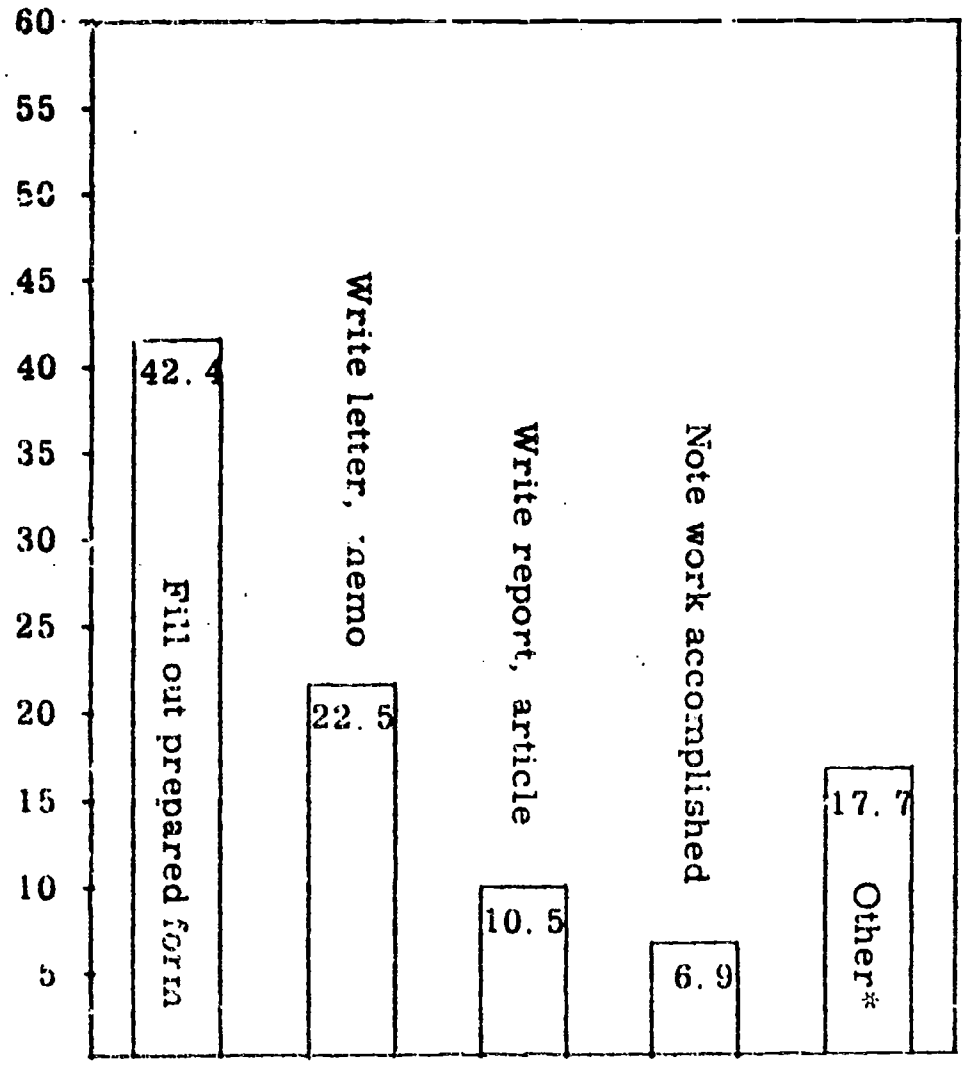
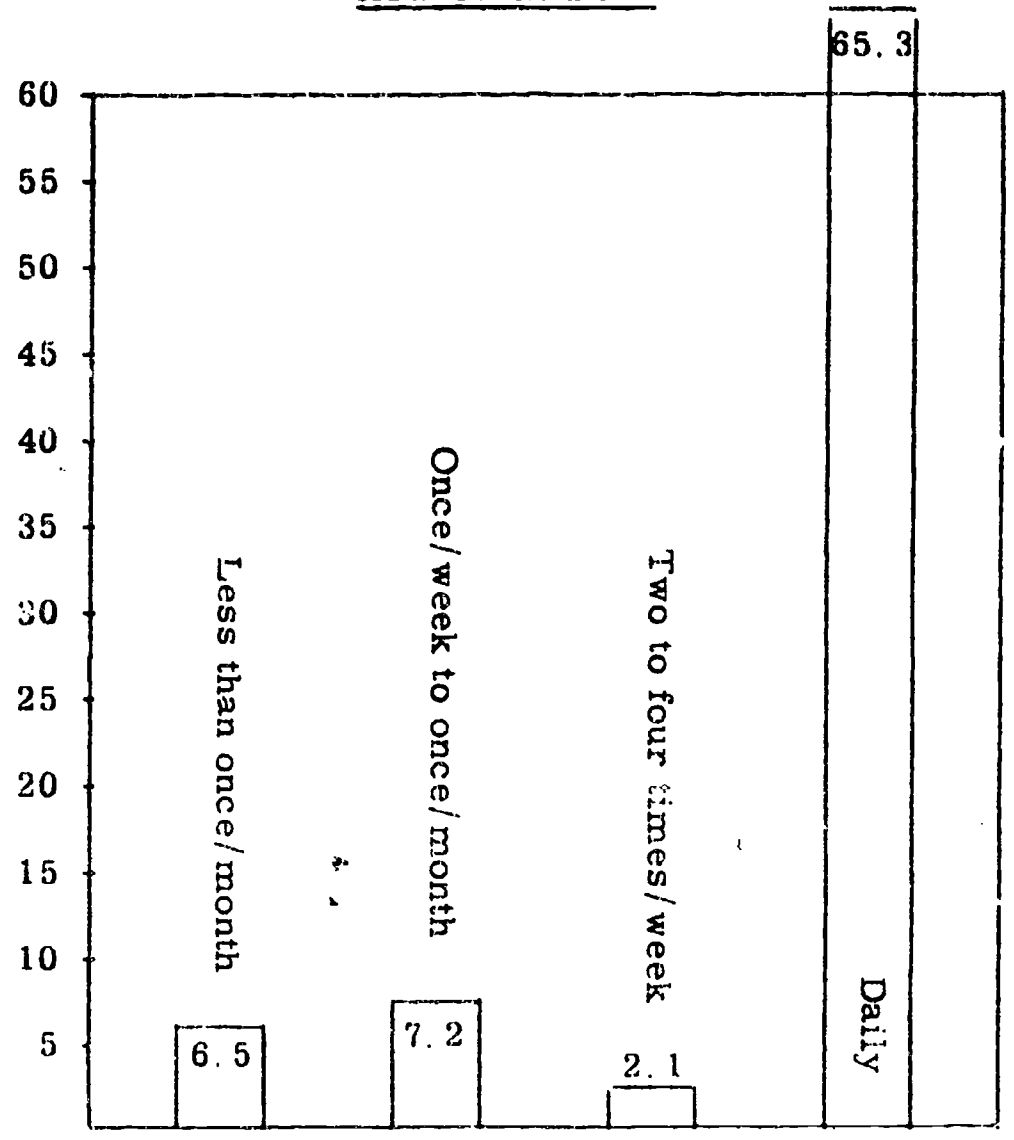


FIGURE 9
Description of Writing Tasks on Jobs:
Type of Task
(276 tasks cited)



*Other includes: blueprints, writing dimension on stones, keypunching, marking products, etc.

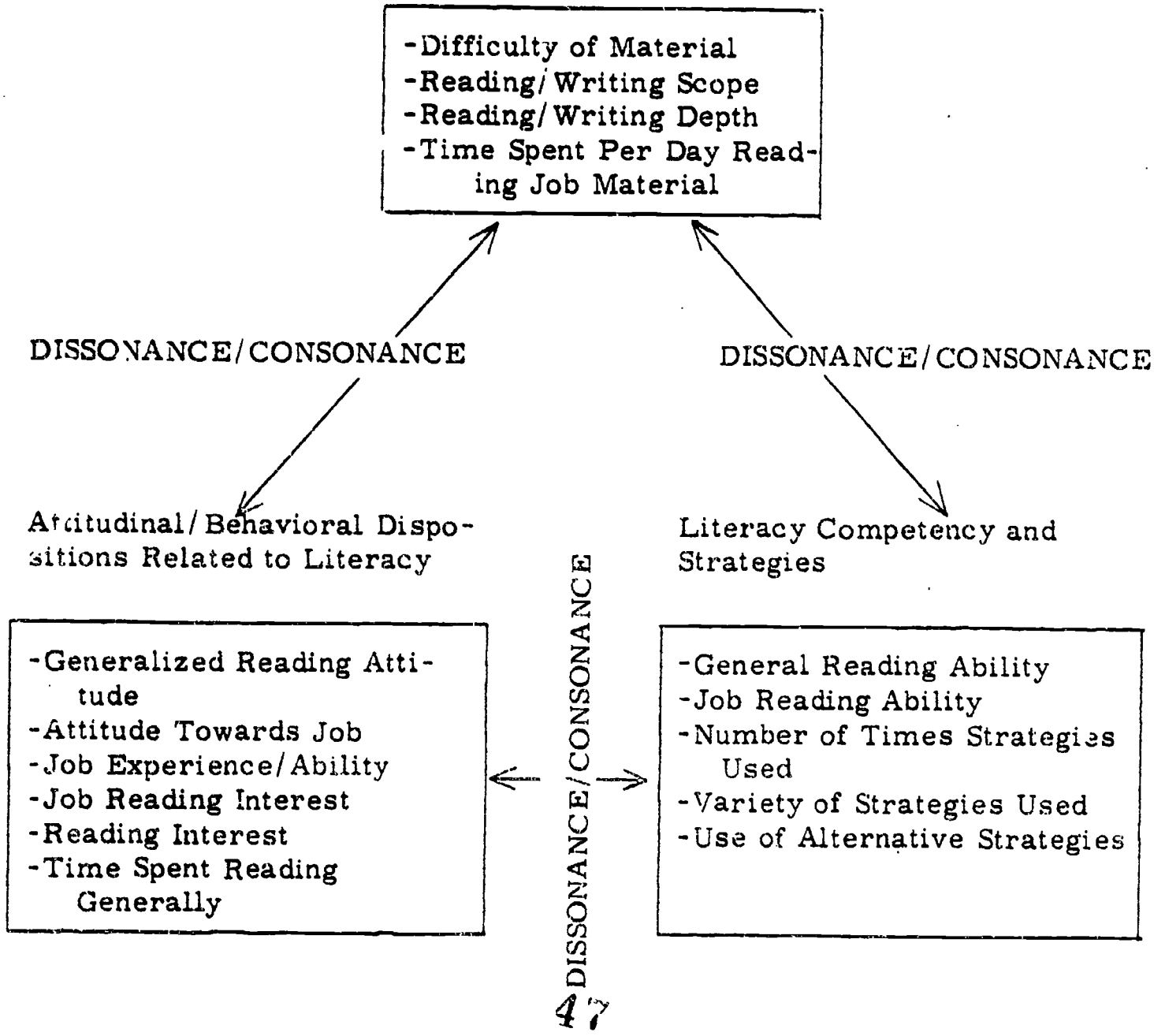
FIGURE 10
Description of Writing Tasks on Job:
How Often Done



In addition to describing the literacy tasks of jobs, this investigation collected data on a number of variables hypothesized to influence functional literacy. An heuristic device (Figure 11) was developed to conceptualize the interrelationship of these variables. Consonance between factors (e.g., where reading ability matched reading demands) would indicate functional literacy, while dissonance (e.g., poor attitude matched with high demands) might lead to problems with the literacy tasks. These variables and categories of variables were used in analysis of hypotheses as reported later in this section and/or

FIGURE 11

Conceptualization of Factors Influencing Functional Literacy: Literacy "Model"



in Diehl (1980). The constructs outlined in Figure 11 were examined using multiple regression and exploratory factor analysis techniques, and were found, overall, to accurately represent the data. These results are described in detail in Diehl (1980). Appendix E of this report contains summary statistics of multiple regression analyses using all the factors in Figure 11.

Tables I to III present descriptive statistics on variables used in this study. Technical information on data reduction procedures and validation of variables can be found in Diehl (1980).

Table I contains descriptive statistics on demographic variables. Table II describes the attitudinal/behavioral variables outlined in the heuristic device (Figure 11), while Table III describes the competency/strategy variables. Of special note in these tables is the mean general reading time (195 minutes) and the fact that the Grade Equivalency score on the job cloze is higher than the GE score on the general cloze (12.27 and 10.59 respectively). This difference is significant ($p < .01$) indicating the possibility that subjects are more proficient at reading their job materials than they are reading general materials.

Additionally, four "literacy demands" variables are included in the heuristic device. These variables represent different types of demands. "Difficulty of material" is the readability level of job material samples (106 samples; $\bar{x}$ = 10.9 Grade Equivalency score). "Amount of time reading on the job per day" is subject-estimated ($\bar{x}$ = 112.5 minutes, a figure close to Sticht's, 1975, findings of 2 hours per day in military job settings). "Scope of literacy demands" reflects the variety of literacy tasks encountered ($\bar{x}$ = 13.5) while "depth of literacy demands" reflects the complexity of tasks (e.g., subject uses printed material to determine facts, to compare information, to evaluate usefulness, etc.; $\bar{x}$ = 8.9)

DESCRIPTIVE TABLE I
Descriptive Statistics for Demographic, Including Occupational, Variables for this Sample

Variable	Percent in Sample	Variable	Percent in Sample
1. Sex		4. Schooling Completed	
Male	64.8	Less than high school	19.2
Female	35.2	High school/GED	23.2
		Some post high school	30.3
2. Race		College	19.2
White	82.9	Graduate work	8.1
Black	15.2		
Hispanic	1.9	5. DOT Occupational Level	
		Professional, technical, managerial	31.8
3. Length of Time on Job		Clerical, sales	30.8
Less than 6 months	14.0	Service occupations	4.7
6 months to a year	19.6	Processing	1.9
1 to 2 years	12.1	Machine trades	17.8
2 to 5 years	23.3	Benchwork	3.7
over 5 years	28.0	Structural work	3.7
No response	3.0	Miscellaneous	5.6

Variable	Mean	Standard Deviation	Range	N
6. Income	$15,587	$11,967	$5,200-37,000	99
7. Status	44.58	17.77	12 - 95	107
8. Responsibility	7.44	3.48	2 - 15	107

DESCRIPTIVE TABLE II
Descriptive Statistics for Attitudinal/Behavioral Disposition Towards Job Literacy Variables

Variable	Mean	Standard Deviation	N
1. General Reading Attitude (ATTTOT)	67.59	16.68	105
2. Reading Interest/Motivation (INTENMO)	19.37	3.76	106
3. General Reading Time (GENRGT)	195.32	140.40	107
4. Attitude Towards Job (JOBINT)	9.39	1.60	106
5. Job Reading Interest (JLTGOOD)	13.22	1.55	106

DESCRIPTIVE TABLE III
Descriptive Statistics for Competency/ Strategy Variables

Variable	Mean	Standard Deviation	N
1. General Reading Ability (SRCLZ) (GE score on general cloze)	10.59	2.40	100
2. Job Reading Ability (SRJCLZ) (GE score on job cloze)	12.27	2.81	35
3. Number of Strategies Used (NBRSTRG)	10.74	4.99	106
4. Variety of Strategies Used (VARSTRG)	8.05	2.88	105
5. Alternative Strategies Used (ALTTOT)	2.50	3.41	107

The variables in this study were also examined to determine the differences in scores across occupational levels. Table 5 describes the groupings that were used on each measure of occupational success (income, status and responsibility); these groupings are based on quartile divisions of the sample.

Table 6 describes the distribution of scores on each major variable across occupational groupings. The significance of differences between occupational groupings are discussed later in this paper and in Diehl (1980).

For purposes of statistical analysis, the various indicators of job success were divided into four grouping each. These groupings are as follows:

Table 5
Groupings for the Measures of Occupational Level, Based on Quartiles

Variable	Group 1	Group 2	Group 3	Group 4
Income	less than $8,000	$ 8,000-$13,000	$13,000-$19,700	greater than $19,800
Status (on 100-point scale)	greater than 58	49-58	40-49	less than 40
Responsibility* (data and people)	less than 5	5 to 7	8 to 9	greater than 9

*The Dictionary of Occupational Titles assigns rankings to jobs based on three types of job responsibilities. This "Responsibility" measure is the sum of the rankings for the DOT categories of responsibility with data and with people. A score of eight on this measure could thus describe a job with high responsibility for people (score of seven) but low responsibility with data (score of 1), or it could describe a job with about average responsibility for both data and people. Although it is not clear exactly what a score of eight means, a score of eight does represent more overall responsibility than a score of seven, and less than a score of nine. See Appendix E for description of the DOT rankings.

Table 6

Mean Scores on Literacy Demands, Strategies and Competencies Variables: By Occupational Success Levels

	General reading level/ cloze	Job reading level/ cloze	Difficulty of job materials	General reading time	Job reading time	Variety of Strategies	Scope of literacy demands	Depth of literacy demands
INCOME								
1) above $19, 800	11.2	13.3	10.9	202	117	9.5	17.6	11.7
	(23)	(8)	(9)	(25)	(25)	(25)	(25)	(25)
2) $13-19, 800	10.4	13.0	11.0	258	168	8.7	15.3	11.1
	(22)	(9)	(15)	(23)	(23)	(23)	(23)	(23)
3) $8, 100-12, 900	10.0	12.6	11.4	143	84	7.1	11.0	7.5
	(23)	(7)	(15)	(25)	(25)	(25)	(24)	(25)
4) less than $8, 100	10.4	10.7	10.3	186	99	7.2	10.0	5.2
	(24)	(9)	(16)	(26)	(26)	(25)	(25)	(26)
JOB STATUS								
1) above 60	11.5	13.5	11.2	222	140	10.1	17.9	13.6
	(21)	(12)	(13)	(25)	(25)	(25)	(25)	(25)
2) 50-60	10.3	12.6	11.1	242	113	8.2	14.4	9.0
	(31)	(9)	(18)	(33)	(33)	(31)	(32)	(32)
3) 40-49	11.8	12.8	10.9	184	99	8.7	14.0	10.1
	(11)	(6)	(11)	(13)	(13)	(13)	(13)	(13)
4) less than 40	9.9	10.0	10.5	121	98	6.4	9.2	5.3
	(25)	(8)	(16)	(36)	(36)	(36)	(35)	(36)
FACTOR COMPOSITE SCORE OF INCOME, STATUS AND RESPONSIBILITY								
1) above .6719	13.6	11.0	11.2	223	145	9.7	17.4	12.1
	(10)	(12)	(23)	(25)	(25)	(25)	(25)	(25)
2) .1416 to .6681	12.6	11.1	10.2	192	102	8.5	15.2	10.2
	(7)	(14)	(24)	(25)	(25)	(24)	(25)	(25)
3) -.7547 to .0990	12.6	11.1	10.9	188	116	7.6	12.3	8.2
	(10)	(18)	(24)	(26)	(26)	(26)	(25)	(26)
4) less than -.7547	9.5	10.2	9.7	183	91	6.3	8.8	4.6
	(6)	(12)	(22)	(24)	(24)	(24)	(24)	(23)
RESPONSIBILITY								
1) above 10	10.9	12.7	10.5	187	99	9.3	15.2	107
	(21)	(10)	(16)	(23)	(23)	(23)	(23)	(23)
2) 8-9	10.8	13.1	11.4	185	104	8.8	17.0	12.0
	(29)	(10)	(15)	(31)	(31)	(30)	(31)	(31)
3) 5-7	10.6	11.1	10.8	231	153	7.5	12.0	7.3
	(31)	(8)	(17)	(32)	(32)	(31)	(32)	(32)
4) less than 5	9.9	12.2	11.2	164	79	6.4	8.2	4.8
	(19)	(7)	(10)	(21)	(21)	(21)	(20)	(20)
DOT CLASSIFICATION								
1) professional, technical, managerial	11.7	12.9	11.0	228	123	9.4	17.9	13.0
	(30)	(12)	(19)	(33)	(33)	(33)	(33)	(33)
2) clerical, sales	10.3	11.8	11.2	242	163	7.8	13.2	8.3
	(32)	(11)	(18)	(33)	(33)	(33)	(33)	(33)
3) service occupation	10.7	13.1	9.2	188	84	8.0	10.3	4.5
	(5)	(3)	(6)	(6)	(6)	(6)	(6)	(6)
4) "blue collar"	9.9	12.0	11.2	121	53	7.2	10.1	6.9
	(27)	(9)	(13)	(29)	(29)	(29)	(28)	(28)

Summary

Results: Working Hypothesis One

Job literacy demands are related to the level of occupational success. Higher level occupations have higher literacy demands.

Null Hypotheses:

1a. The scope of literacy demands is equal across occupational success levels

1b. The depth of literacy levels is equal across occuaptional success levels

1c. The difficulty of reading materials is equal across occupational success levels

1d. The amount of time reading per day for the job is equal across occupational levels

1e. The variety of strategies used is equal across occupational success levels

With the exceptions of comparisons involving difficulty of material and job reading time, all variables examined in this hypothesis are significantly correlated at the $p < .05$ level (see Tables 7 and 8). ANOVAS and Student t tests indicate that significant differences exist among the various groupings of each measure of occupational success on most measures of "literacy demands." These results directly address the null hypotheses of this section (see Table 9).

The first null hypothesis--that the scope of literacy demands is equal across occupational success levels--is rejected. Significant ($p < .01$) differences appear among groups on all measures of occupational success using ANOVA. Student t tests indicate that, in general, the higher level groups have significantly higher scores on this variable than the lower groups. The scope of demands appears to be directly related to the occupational level of a subject.

The second null hypothesis--that the depth of literacy demands is equal across occupational success levels--is rejected (see Table 9). Significant ($p < .01$) differences appear among all groups on all measures of success using ANOVA. Student t tests indicate that higher level occupations have significantly higher scores on "depth of demands" than lower level groups.

TABLE 7

Pearson Product Moment Correlations Among Six Demand and Four Occupational Success Variables

	Income	Status	Respon-sibility	Factor/ Success	Scope of demands	Depth of demands	Difficulty of materials	Time reading on job	Variety of Strategies
Income (with Log 10 transformations)									
Status (with square root transforma's)	.599** (99)[1]								
Responsibility (for data and people	.410** (99)	.491** (107)							
Composite factor score of success	.711** (99)	.947** (100)	.614** (100)						
Scope of literacy demands	.449** (99)	.489** (106)	.424** (106)	.525** (99)					
Depth of literacy demands	.387** (99)	.524** (105)	.419** (105)	.555** (99)	.788** (105)				
Reading difficulty of material	.277* (55)	.325** (58)	-.198 (58)	.327** (56)	.009 (58)	.129 (58)			
Amt. of time spent reading on job/day w/square root transformations	.266** (99)	.172* (107)	.104 (107)	.273** (99)	.396** (105)	.269** (106)	.138 (58)		
Variety of Strate-gies	.255** (99)	.466** (106)	.383** (106)	.462** (99)	.392** (102)	.365** (103)	-.111 (56)	.177 (104)	
Composite factor score of literacy demands	.457** (98)	.508** (106)	.428** (106)	.568** (99)	.985** (105)	.812** (106)	.142 (58)	.395** (106)	.387** (103)

*p< .05 **p < .01 [1](99) = N

TABLE 8

Kendall Correlations of Demands and Occupational Success Variables with "Occupational Group"

	Occupational Group (DOT Classification)
Income	.129* (99)[1]
Status	.158* (107)
Responsibility	.329** (107)
Composite factor score/success	.314** (100)
Scope of literacy demands	.407** (105)
Depth of literacy demands	.388** (106)
Reading difficulty of materials	.096 (58)
Amount of time reading on job per day	.238** (107)
Variety of strategies	.227** (104)
Composite factor score/demands	.347** (106)

*$p < .05$ **$p < .01$

[1](99) = N

TABLE 9: Summary Results for ANOVA and Student t tests: Literacy Demands By Occupational Success Levels [1]

	Scope of Demands		Depth of Demands		Variety of Strategies		Difficulty of Material		Time Reading on Job, per Day	
	F	t comp.	F	t comp.	F	t comp.	F	t comp.	F	t comp.
INCOME	11.33**	1+2>3+4** 1>3,4** 2>3,4**	11.15**	1+2>3+4** 1>3,4** 2>3,4**	4.40**	1+2>3+4** 1>3,4** 2>3*	2.22	3>4**	2.54	1+2>3+4* 2>3,4*
JOB STATUS	13.70**	1+2>3+4** 1>2,3* 1>4** 2>4* 3>4*	18.40**	1+2>3+4** 1>2,4** 1>3* 3>4**	11.24**	1+2>3+4** 1>2,4** 3>4**	0.95	n.s.	0.69	n.s.
RESPON. FOR DATA	20.83**	1>2,3**	23.82**	1>2,3**	9.59**	1>2,3**	0.16	n.s.	3.16*	2>3*
RESPON., TOTAL	12.11**	1>3* 1>4** 2>3,4** 3>4*	12.36**	1>3* 1>4** 2>3,4**	5.48**	1>2,3* 1>4** 2>3* 2>4**	1.85	2>1*	1.92	3>4*
OCCUPATIONAL LEVEL	12.15**	1+2>3+4** 1>2,3** 1>4** 2>4*	12.37	1+2>3+4** 1>2,3** 1>4**	3.38*	1+2>3+4* 1>2* 1>4**	5.75*	1>3** 2>3** 4>3**	5.03**	1+2>3+4* 1>4** 2>4**

* $p < .05$
** $p < .01$

The third null hypothesis--that the reading difficulty of materials is equal across occupational levels--is accepted (see Table 9). Only when the measure of "occupational level" (based on DOT classifications) is used do significant ($p < .05$) differences among groups appear. While Student t tests also indicate that group 3 scores higher than group 4 on the income measure, this is the only significant difference found. Therefore, it appears that, in general, the difficulty of material (in terms of grade equivalency using the FORCAST) does not differ significantly by occupational level.

The fourth null hypothesis--that the amount of time spent reading per day for the job is equal for occupational levels--is partially accepted (see Table 9). ANOVA indicates that significant differences among groups exist using the "responsibility for data" ($p < .05$) and the "occupational level" ($p < .01$) variables. No significant differences are reported on the other measures of occupational success using analysis of variance. Student t tests do reveal several significant differences between groups. In each measure of occupational success, at least one higher group scored significantly higher on this variable than a lower group. Results are not consistent, however, across measures, and the most that can be concluded is that some differences exist, with higher levels tending to read more on the job than lower levels; this trend is statistically significant in only a few comparisons and, in fact, on several measures, lower groups score higher than the higher groups. The null hypothesis is therefore accepted in general, with the note that there appears to be some tendency for higher level occupations to read more than lower levels.

The fifth null hypothesis--that the variety of strategies used is equal across occupational success levels--is rejected. Significant ($p < .01$) differences appear among all groups on all measures of occupational success, using analysis of variance. Student t tests indicate that higher level occupations

tend to use significantly wider variety of strategies than lower level occupations. While there are some exceptions, most comparisons are significant. Variety of strategies used appears to be directly related to occupational level.*

In addition to analysis of variance and Student t tests, multiple regression analyses are used to further describe the relationship between job literacy demands and occupational success. These analyses indicate that occupational success measures (of income, status and responsibility) can explain about 7 percent of the total variance in job reading time, 25 percent of the total variance in both variety of strategies and difficulty of materials, and about 31 percent of the total variance of both the scope and depth of demands (see Table 10). Job status tends to be the best predictor of literacy demands (with the exception of predicting job reading time). Job status is a significant predictor ($p < .05$) for difficulty of material ($R^2 = .11$), variety of strategies ($R^2 = .22$), scope of demands ($R^2 = .24$) and depth of demands ($R^2 = .27$).

Multiple regression analysis is also used to analyze the extent to which various job literacy demands can account for the variance of the measures of occupational success (Occupational Level, Responsibility, Status, and Income). Job literacy demands can account for 26 percent of the total variance in occupational level, 29 percent of the total variance in income, 32 percent of the total variance in job responsibility, and 49 percent of the total variance in status (see Table 11).

Summary Results: Working Hypothesis 2

Job literacy competency is correlated with factors other than general reading ability and literacy demands of the job; job literacy competency is also significantly correlated to length of time on the job, general reading attitude, job reading interest, and attitude towards the job.

Null Hypotheses:

2a. Length of time on the job, general reading attitude, job reading interest and attitude towards the job are not significantly ($p < .05$) correlated with job literacy competency.

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*For additional ANOVA information see Appendix D.

TABLE 10
Summary Results[1] of Multiple Regression Analyses Using Measures of "Literacy Demands" as Dependent Variables and Measures of "Occupational Success" as Independent Variables

Scope of Demands Dependent				
Variable	F to Enter	R^2	R^2 Change	N
1. Status	29.79***	.239	.239	97
2. Income	4.43*	.273	.034	97
3. Responsibility	4.65*	.308	.035	97

Depth of Demands Dependent				
Variable	F to Enter	R^2	R^2 Change	N
1. Status	36.36***	.275	.275	98
2. Income	.79	.281	.006	98
3. Responsibility	4.25*	.312	.031	98

Variety of Strategies Dependent				
Variable	F to Enter	R^2	R^2 Change	N
1. Status	26.39***	.217	.217	97
2. Responsibility	3.78	.248	.030	97
3. Income	.73	.254	.006	97

Job Reading Time Dependent				
Variable	F to Enter	R^2	R^2 Change	N
1. Income	7.39**	.071	.071	99
2. Status	(insufficient F for further computations)			
3. Responsibility				

Difficulty of Materials Dependent				
Variable	F to Enter	R^2	R^2 Change	N
1. Status	6.71*	.112	.112	55
2. Income	.38	.119	.006	55
3. Responsibility	9.27**	.254	.135	55

*p< .05
**p< .01
***p< .001
[1]Complete Results are available in Diehl, 1980)

TABLE 11
Summary Results of Multiple Regression Analyses Using Measures of "Occupational Success" as Dependent Variables and Measures of "Literacy Demands" as Independent Variables

Occupational Level (DOT Classification) Dependent

Variable	F to Enter	R^2	R^2 Change	N
1. Scope of Demands	8.15**	.208	.208	105
2. Job Reading Time	1.21	.239	.031	107
3. Depth of Demands	.46	.251	.012	106
4. Diffic'ty of Mat.	.20	.256	.005	58
5. Var. of Strat.	.12	.259	.003	104

Job Responsibility (DOT Rankings) Dependent

Variable	F to Enter	R^2	R^2 Change	N
1. Depth of Demands	9.25**	.230	.230	106
2. Diffic'y of Mat.	2.24	.283	.054	58
3. Var. of Strat.	1.52	.319	.036	104
4. Scope of Demands	- .13	.322	.003	105
5. Job Reading Time	(Insufficient F for further computation)			

Job Status Dependent

Variable	F to Enter	R^2	R^2 Change	N
1. Depth of Demands	15.00**	.326	.326	106
2. Var. of Strat.	3.61	.399	.072	104
3. Diffic'y of Mat.	4.34*	.477	.078	58
4. Scope of Demands	.33	.483	.006	105
5. Job Reading Time	.15	.486	.003	107

Income Dependent

Variable	F to Enter	R^2	R^2 Change	N
1. Scope of Demands	7.84**	.202	.202	105
2. Var. of Strat.	3.08	.276	.074	104
3. Diffic'y of Mat.	.59	.291	.014	58
4. Job Reading Time	.10	.293	.003	107
5. Depth of Demands	(Insufficient F for further computation)			

*$p < .05$
**$p < .01$

2b. General reading ability and difficulty of literacy materials account for the variance in job literacy ability; length of time on the job, reading attitude, job reading interest and attitude towards the job do not contribute significantly ($p < .05$) to explaining the variance in reading ability on the job.

Most of the variables examined in this hypothesis are not significantly correlated (see Tables 12 and 13). General reading attitude is correlated with job reading interest ($p < .01$), and general reading ability is significantly correlated with job reading ability ($p < .01$). Other variables (attitude towards the job, difficulty of materials, and length of time on the job) are not significantly correlated with any others. The correlation between general reading ability and job reading ability remains significant at the .01 level when difficulty of material, length of time on the job, job reading interest, and attitude towards the job are partialled out (see Table 14). The correlation is significant at the .05 level when general reading attitude is partialled out. These partial correlations suggest that attitude variables have little effect on the realtionship between general and job reading ability; it might be concluded that a subject's attitudes (as measured in this study) do not diminish the correlation between general and job reading ability (i.e., they do not contribute to better job reading in and of themselves).

Based on these correlational analyses, the first null hypothesis--that length of time on the job, general reading attitude, job reading interest and attitude towards the job are not significantly correlated with job literacy competency--is accepted. No significant correlations are found among these variables.

Multiple regression analyses are used to address the second null hypothesis--that length of time on the job, reading attitude, job reading interest, and attitude towards the job do not contribute significantly to explaining the variance in reading ability on the job once general reading ability and the difficulty of materials have been partialled out. This hypothesis is accepted (see

TABLE 12
Pearson Product Moment Correlation Coefficients for General Reading Attitude, Job Reading Interest, Attitude Towards the Job, General Reading Ability, Job Reading Ability, Difficulty of Materials

	ATTTOT	JLTGOOD	JOBINT	SRCLZ	SRJCLZ
General Reading Attitude (score on MBRAM) (ATTTOT)					
Job Reading Interest (Comfort/self-perceived ability with job materials (JLTGOOD)	.266** (105)				
Attitude Towards Job (interest/comfort with tasks) (JOBINT)	-.050 (105)	.096 (103)			
General Reading Ability (GE score on general cloze) (SRCLZ)	.286** (98)	.063 (99)	-.118 (98)		
Job Reading Ability (GE on job cloze) (SRJCLZ)	.256 (34)	.218 (35)	-.068 (35)	.466** (35)	
Difficulty of materials (FORCAST readability average) (READIFF)	-.053 (57)	-.081 (58)	-.028 (58)	.004 (54)	-.154 (35)

*p < .05 **p < .01

Tables 15-17). When the four "interest" variables are entered in the regression analysis after general reading and difficulty of material, using the job cloze GE as the dependent variable, the four interest variables account for only about five percent of the total variance. When the four variables are entered first, they account for about 11 percent of the total variance. Lastly, when difficulty of material is used as the dependent variable and the four "interest" variables are entered after "general reading ability" they account for about 12 percent of

TABLE 13

Kendall's Correlation Coefficients for "Length of Time on the Job" with Other, Selected Variables

	Length of Time on Job
General Reading Attitude	-.088 (104)
Job Reading Interest	-.090 (106)
Attitude towards Job	-.064 (104)
General Reading Ability***	-.013 (100)
Job Reading Ability***	.098 (35)
Difficulty of Materials	.001 (58)

TABLE 14

Results of Partial Correlation: Job Reading Ability with General Reading Ability, Controlling for Reading Difficulty and for Four Interest Variables

Controlling for:	Correlation of Job Reading Ability with General Reading Ability
Difficulty of Materials	.467** (33)
Length of Time on Job	.464** (35)
General Reading Attitude	.419* (35)
Job Reading Interest	.459** (35)
Attitude Towards the Job	.457** (35)

*$p < .05$ **$p < .01$ ***Based on GE of cloze test scores.

Table 15

Multiple Regression Predicting Job Cloze Ability Using First: Difficulty of Materials and General Cloze Ability, Second: Job Reading Interest, Job Attitude, Length of Time on the Job, General Reading Attitude Variables Entered Simultaneously and Hierarchially

Step Ent'd	Variables	N.	Mean	F to enter or remove	Significance	Multiple R	R Square	R Square Change	Simple R	Overall F
1	Diff. of Mat's	34	11.06	1.161	.290	.1558	.0243	.0243	-.1558	7.298**
	General Cloze	34	11.00	13.489	.001	.5658	.3201	.2958	.5428	
2	Job Rdg Interest	34	12.97	1.380	.250	.5922	.3507	.0306	.2337	2.598*
	Job Attitude	34	9.18	.068	.796	.5924	.3510	.0003	-.0781	
	Lgth Time on Jb	34	3.18	.623	.437	.6039	.3647	.0137	.1178	
	Gen. Rdg. Attit.	34	67.76	.058	.811	.6050	.3661	0014	.2564	

Table 16

Multiple Regression Predicting Job Cloze Ability Using First: Job Reading Interest, Job Attitude, Length of Time on Job, General Reading Attitude; Second: Difficulty of Material and General Cloze Ability

Step Ent'd	Variables	N	Mean	F to enter or remove	Significance	Multiple R	R Square	R Square Change	Simple R	Overall F
1	Lgth Time on Jb	34	3.18	.5263	.474	.1178	.0139	.0139	.1178	.922
	Gen. Rdg. Attit.	34	67.76	1.0595	.312	.2723	.0741	.0603	.2564	
	Job Attitude	34	9.18	.0104	.920	.2763	.0764	.0022	-.0781	
	Job Rdg. Interest	34	12.97	1.1936	.284	.3359	.1129	.0366	.2337	
2	Diff. of Mat's	34	11.06	1.1205	.299	.3732	.1393	.0284	-.1558	2.598*
	General Cloze	34	11.00	9.6578	004	.6050	.3661	.2268	5428	

Table 17

Multiple Regression Predicting Difficulty of Materials Using First: General Cloze Score; Second: Job Reading Interest, Job Attitude, Length of Time on Job, General Reading Attitude

Step Ent'd	Variables	N	Mean	F to enter or remove	Significance	Multiple R	R Square	R Square Change	Simple R	Overall F
1	General Cloze	34	11.00	.0015	.969	0069	.0001	.0001	.0069	.0015
2	Job Rdg. Int'st	34	12.97	.4678	.500	.1451	.0211	.0210	-.1441	.8302
	Lgth. Time on Jb	34	3.18	2.2634	144	.2769	.0767	.0551	.2546	
	Job Attitude	34	9.18	1.5859	218	.3496	1222	0456	- 1527	
	Gen. Rdg. Attit.	34	67.76	2221	641	.3593	.1291	.0069	- 0578	

of the total variance. None of the "interest variables" has a significant ($p < .05$) F in any of the analyses. It would appear these variables do not contribute significantly to explaining job-literacy competency.

Summary Results: Working Hypothesis Three

The majority of tasks encountered on the job require reading-to-do rather than reading-to-learn or reading-to-assess strategies. Differences will appear among occupational levels, with higher levels requiring more reading-to-do and reading-to-assess.

Null Hypotheses:

3a. There are no differences in the number of times reading-to-do, reading-to-learn and reading-to-assess strategies are used.

3b. There are no differences among occupational levels in types of strategies used.

Student t tests indicate that significant differences exist in the number of time reading-to-do, reading-to-learn and reading-to-assess are cited as being used by subjects. The first null hypothesis is thus rejected. Significantly ($p < .01$) more reading-to-do tasks were cited than either reading-to-asses or reading-to-learn. Significantly more reading-to-assess tasks were cited than reading-to-learn tasks ($p < .01$). (See Table 18.)

TABLE 18
Student t test Comparisons: Read-to-Do, Read-to-Learn, and Read-to-Assess Variables

Pair	N	Mean	s.d.	T value	df	2-tail prob.
Read-to-Learn	107	.355	.676	-10.96	106	.000
vs						
Read-to-Do		2.009	1.321			
Read-to-Learn	107	.355	.676	- .386	106	.000
vs						
Read-to-Assess		.822	1.044			
Read-to-Do	107	2.009	1.321	6.15	106	.000
vs						
Read-to-Assess		.822	1.044			

Analysis of variance and Student t tests are used to test the second null hypothesis--that there are no differences among occupational levels in types of strategies used. Analysis of variance indicates that, except on the "occupational level" (based on the DOT) variable, there are no significant differences among groups in the number of reading-to-do tasks cited (see Table 19). Student t tests reveal some differences (in job status, group 2 > group 1, $p < .05$; in occupational level, group 2 > group 1, $p < .05$ and group 4, $p < .05$). Generally, however, occupational levels do not seem to differ significantly in the number of reading-to-do tasks done. The null hypothesis is accepted for reading-to-do tasks (Table 5 defines group levels).

Analyses of variance indicates significant differences among groups in the number of reading-to-learn tasks, but only on the "responsibility of the job" and the "job status" measures. Student t tests indicate a slight trend, on these two measures only, for higher level groups to have more reading-to-learn tasks than lower level groups. Because these results are not consistent, and because they are not found on the other three measures of occupational success, the null hypothesis is accepted for reading-to-learn tasks. These tasks also tend to not differ in frequency across occupational level.

Analysis of variance revealed significant differences across all measures of occupational success on the reading-to-assess variable. Student t tests reveal that, in responsibility of the job, the second highest group tends to have significantly more reading-to-assess tasks than the other groups. On the other measures of occupational success, the higher groups tend to have significantly higher numbers of reading-to-assess tasks. The null hypothesis is rejected for reading-to-assess tasks.

In general, then, ANOVA and Student t tests indicate that the number of

TABLE 19
Summary Results of ANOVA and Student t Tests of Significant Differences Among Occupational Success Groups by Variables Tapping Strategies Used

	RESPONSIBILITY			STATUS			OCCUPATIONAL LEVEL			INCOME		
	F-Ratio	t Test Results	N	F-Ratio	t Test Results	N	F-Ratio	t Test Results	N	F-Ratio	t Test Results	N
Number of Read-to-Do Tasks (DOING)	1.48	ns	107	1.80	2>1*	107	3.14*	2>1* 2>4*	101	1.69	ns	99
Number of Read-to-Learn Tasks (LEARN)	4.41**	1>3* 1>4** 2>3* 2>4*	107	3.26*	1>4* 3>4*	107	.27	ns	101	1.42	ns	99
Number of Read-to-Assess Tasks (ASSESS)	4.25**	2>1* 2>3** 2>4*	107	7.83**	1>2* 1>3** 1>4**	107	6.60**	1>2** 1>3** 1>4**	101	7.57**	1>2* 1>3** 1>4**	99
Rankings of Importance of Reading and Writing Tasks (IMPTASK)	4.12**	1>4* 2>4** 3>4**	105	5.03**	1>4** 2>4** 3>4**	107	1.35	1>4*	99	1.61	ns	97

*p .05
**p .01

For Status, see page 12; for Occupational Level, see page 17.

reading-to-do and reading-to-learn tasks cited do not differ significantly among occupational levels. The number of reading-to-assess tasks does differ significantly, with higher level occupations tending to have more such tasks than lower level occupations.

Summary of Major Results and Conclusions

The preceding sections of this monograph presented and discussed the results of this study. Because of the nature of the study, and the use of multiple analyses in examining data, a relatively large number of results are reported. This section attempts to briefly outline the major findings and the conclusions drawn from them. The findings are presented in general terms, and exceptions are not elaborated upon; the reader is advised to read the appropriate sections of this report for a full analysis and/or discussion.

The major results, in generalized terms, and the conclusions of this study are as follows:

1. Almost all subjects report some reading and/or writing tasks as a part of their jobs; close to 99 percent of the sample report doing some reading during the day at work. Although the 99 percent should not be generalized to the total population, it can be concluded that most people do some reading at work.

2. Subjects report an average of 113 minutes a day spent job-reading. Although this figure is higher than that reported in other studies, it may be because reading is so closely related to other job tasks that it is often overlooked by subjects reporting on time spent reading. There are indications that the figure of 113 minutes (or close to two hours) accurately reflects job-reading time. While the 113 minute result should not be generalized to the total population, it does indicate that workers, overall, tend to read a great deal on the job, and probably read job materials longer per day than any other type of

material. This conclusion would suggest that job-related literacy is the most important type of functional literacy, and should perhaps be stressed to a greater extent in functional literacy programs.

3. Literacy tasks done on jobs tend to be highly repetitive and an integrated part of other job tasks. Reading material are most often used as a type of external memory or reference.

4. Reading tasks tend to be viewed as "important, but not vital" to the completion of job tasks. Thus subjects indicate, more often than not, that either the information from texts is not vital to completing a task, or the information could be gotten from a non-print source. This conclusion suggests that many of the literacy "demands" of a job are really not demands at all; rather, the literacy materials are used, not so much out of necessity, as because they make the job task easier or more efficient. It has been suggested that the literacy "demands" of the workplace are increasing with technological changes. It may be, instead, that demands are not increasing; it may be that the opportunities to use print to help carry out a job task are what are increasing. The distinction between "literacy demands" and "literacy availability" is an important one. It may be that some jobs are unnecessarily closed to people with little education or poor reading ability, based on a false estimation of the "demands" of the job.

5. The majority of reading and writing tasks are done on the job frequently--often daily. Many subjects report reading identical materials to do identical tasks every day.

6. Reading tasks tend to be of a reading-to-do type significantly more often than of a reading-to-learn or reading-to-assess type. Most often, subjects appear to use a rapid search strategy to locate information appropriate for a particular task, with no prior intention of remembering the information, and

then apply the information to the task. This use of print appears to be done in about two-thirds of the cases cited.

7. Writing tasks on the job tend to also be brief in nature, most often involving filling out prepared forms or completing short memos or letters.

8. As measured by the FORCAST readability formula, the difficulty of job materials for fifty-seven of the subjects is at a grade equivalency of about 10.9. This GE score tends to not vary significantly among occupational levels, indicating that lower level occupations (e.g., blue-collar workers) have about as difficult material to read as do higher level occupations. This result, because of the small sample and the problems associated with readability formulas, is probably not generalizable.

9. Based upon the eight results reported above, several conclusions about job literacy tasks can be drawn:

First, literacy tasks on the job are completed in an information-rich context. Because most of the tasks involve the application of information to a particular job task, the job task itself provides a number of extralinguistic cues that help the reader in gaining information quickly and with a minimum of attention.

Second, reading materials on the job tend to be viewed as external memories. Subjects tend not to learn the material because they treat the material as information continually available to them. Rather than store the information in memory (i.e., learn it) they allow the informtion to be kept stored in the written material; at the same time, it is probable that the form the information takes (e.g., chart, graph, etc.) is learned, and is matched with the job-task in the environment; this enables the worker to more quickly use the material in subsequent tasks.

Third, because the reading materials are used in an information-rich context, the main task of the job-reader is to determine the relationship between

the graphic display and objects in the environment. Use of the context, and the repetitious nature of job tasks, probably enables many workers to read material on the job that they would not be able to read in isolation.

Fourth, reading on the job is an ubiquitous activity, and may be the most prevalent type of reading done in the society. This makes job-related reading an important part of the functional literacy domain.

Fifth, reading at work and reading in school settings may be quite different from each other, in terms of extralinguistic cues available, cognitive demands, and uses of information gained. Additional research in this area is needed; if research supports these indications, it would have important implications for the design of functional literacy programs, as well as implications for schools and job training programs.

Sixth, higher level occupations (in terms of income, status, job responsibility, job level, based on the Dictionary of Occupational Titles, tend to have significantly higher scores on "scope of demands," "depth of demands," "variety of strategies" and the "composite, demands" variables than lower level occupations. Little or no difference is found consistently across occupational level on "job reading time" or "difficulty of material." Thus, the time spent reading and the difficulty of the materials do not appear to vary significantly from high to low occupations; the uses to which the material must be put does seem to vary, with higher occupations requiring a greater variety of uses for the printed materials.

Seventh, measures of literacy demands are highly predictive of occupational success levels. These measures can account for up to 50 percent of the total variance in components of occupational success. In fact, the literacy demands are more predictive of occupational success than either the "ability/strategies" or the "attitude" variables (see Appendix E). This may suggest, as other analyses in this study also indicate, that literacy demands are symbolic of

occupational level. It is argued in this study that some evidence indicates that functional literacy has a symbolic, above and beyond a purely pragmatic, importance.

Eighth, the number of reading-to-do tasks cited by subjects is roughly equal across occupational levels. Higher level occupations tend to have more read-to-learn tasks, but the findings are not conclusive. Read-to-assess tasks more clearly differentiate the highest occupational levels from lower ones; higher levels seem to involve a significantly greater use of read-to-assess tasks. These results suggest the possibility that schools may be preparing students mainly for higher level occupations by stressing read-to-learn and read-to-assess tasks.

Ninth, attitude measures are not significantly related, overall, to occupational success or to job reading ability. It may be that the measures used in this study are inadequate, or it may be that attitude and ability are separable constructs. The attitude a worker has towards his/her reading and his/her job may be important, but not in predicting ability or success.

APPENDICES

APPENDIX A

Instrumentation:
The Diehl-Mikulecky Job Literacy Survey

SURVEY

APPENDIX A

Hello, My name is _____ and I'm working with Dr. Larry Mikulecky of Indiana University. We are looking at how much reading and writing is done on various jobs. There are no right or wrong answers to any of the questions on this survey. We're jus t trying to get a picture of the kinds of reading and writing you do.

The first series of questions deals with background in reading and writing. It describes people in a variety of situations.

For example, listen to this description:

1. "You are tired of waiting for the dentist, so you start to leaf through a magazine."

We're going to rate this statement on a scale of one to five according to whether it is very like you or very unlike you. If that description is very like you, I want you to give it a score of 5. If the description isn't like you at all, if it is very unlike you, give it a score of 1. If the description is unlike you, give it a score of 2; if it is between being unlike you and like you, give it a score of 3; if the description is like you, give it a score of 4

So what score would you give the following description? (Reread from above.) (Repeat scores and point meanings for the first few items.)

Okay, the next item is . . .

2. You walk into the office of a doctor or dentist and notice that there are magazines set out.

VERY UNLIKE ME	1 (A)	2 (B)	3 (C)	4 (D)	5 (E)	VERY LIKE ME

3. There are many things you'd rather do than read.

VERY UNLIKE ME	1 (A)	2 (B)	3 (C)	4 (D)	5 (E)	VERY LIKE ME

4. People have made jokes about your reading in unusual circumstances or situations.

VERY UNLIKE ME	1 (A)	2 (B)	3 (C)	4 (D)	5 (E)	VERY LIKE ME

5. You are at a shopping center where you've been several times. Someone comes up to you and asks you where books and magazines are sold You are able to tell the person where to find them.

VERY UNLIKE ME	1 (A)	2 (B)	3 (C)	4 (D)	5 (E)	VERY LIKE ME

6. You are surprised at people who read all the time.

	1	2	3	4	5	
VERY UNLIKE ME	(A)	(B)	(C)	(D)	(E)	VERY LIKE ME

7. You feel very uncomfortable because emergencies have kept you away from reading for a couple of days.

	1	2	3	4	5	
VERY UNLIKE ME	(A)	(B)	(C)	(D)	(E)	VERY LIKE ME

8. You are waiting for a friend in an airport or supermarket and find yourself leafing through the magazines and paperback books.

	1	2	3	4	5	
VERY UNLIKE ME	(A)	(B)	(C)	(D)	(E)	VERY LIKE ME

9. If a group of acquaintances would laugh at you for always being buried in a book you'd know it's true and wouldn't mind much at all.

	1	2	3	4	5	
VERY UNLIKE ME	(A)	(B)	(C)	(D)	(E)	VERY LIKE ME

10. People who are regular readers often ask your opinion about new books.

	1	2	3	4	5	
VERY UNLIKE ME	(A)	(B)	(C)	(D)	(E)	VERY LIKE ME

11. One of your first impulses is to "look it up" whenever there is something you don't know or whenever you are going to start something new.

	1	2	3	4	5	
VERY UNLIKE ME	(A)	(B)	(C)	(D)	(E)	VERY LIKE ME

12. Even though you are a very busy person, there is somehow alsays time for reading.

	1	2	3	4	5	
VERY UNLIKE ME	(A)	(B)	(C)	(D)	(E)	VERY LIKE ME

13. You don't like to discuss reading with friends.

	1	2	3	4	5	
VERY UNLIKE ME	(A)	(B)	(C)	(D)	(E)	VERY LIKE ME

14. You've finally got some time alone in your favorite chair on a Sunday afternoon. You see something to read and decide to spend a few minutes reading just because you feel like it.

	1	2	3	4	5	
VERY UNLIKE ME	(A)	(B)	(C)	(D)	(E)	VERY LIKE ME

15. You tend to disbelieve and be a little disgusted by people who repeatedly say they don't have time to read.

	1	2	3	4	5	
VERY UNLIKE ME	(A)	(B)	(C)	(D)	(E)	VERY LIKE ME

16. You find yourself giving special books to friends or relatives as gifts.

	1	2	3	4	5	
VERY UNLIKE ME	(A)	(B)	(C)	(D)	(E)	VERY LIKE ME

17. At Christmas time, you look into the display window of a bookstore and find yourself interested in some books and uninterested in others.

	1	2	3	4	5	
VERY UNLIKE ME	(A)	(B)	(C)	(D)	(E)	VERY LIKE ME

18. Sometimes you find yourself so excited by a book that you try to get friends to read it.

	1	2	3	4	5	
VERY UNLIKE ME	(A)	(B)	(C)	(D)	(E)	VERY LIKE ME

19. You've just finished reading a story, and you settle back for a moment to sort of enjoy and remember what you've just read.

	1	2	3	4	5	
VERY UNLIKE ME	(A)	(B)	(C)	(D)	(E)	VERY LIKE ME

20. You <u>choose</u> to read non-required books and articles fairly regularly (a few times a week).

	1	2	3	4	5	
VERY UNLIKE ME	(A)	(B)	(C)	(D)	(E)	VERY LIKE ME

21. Your friends would not be at all surprised to see you buying or borrowing a book.

	1	2	3	4	5	
VERY UNLIKE ME	(A)	(B)	(C)	(D)	(E)	VERY LIKE ME

22. You have just gotten comfortably settled in a new city. Among the things you plan to do are to check out the library and the book stores.

VERY UNLIKE ME	1 (A)	2 (B)	3 (C)	4 (D)	5 (E)	VERY LIKE ME

23. You've just heard about a good book but haven't been able to find it. Even though you've tried, you look for it in one more book store.

VERY UNLIKE ME	1 (A)	2 (B)	3 (C)	4 (D)	5 (E)	VERY LIKE ME

24. You read to find out how to get something done.

VERY UNLIKE ME	1 (A)	2 (B)	3 (C)	4 (D)	5 (E)	VERY LIKE ME

25. You read to keep up with what's going on.

VERY UNLIKE ME	1 (A)	2 (B)	3 (C)	4 (D)	5 (E)	VERY LIKE ME

26. You read to discuss what you have read with friends.

VERY UNLIKE ME	1 (A)	2 (B)	3 (C)	4 (D)	5 (E)	VERY LIKE ME

27. You read for relaxation and personal enjoyment.

VERY UNLIKE ME	1 (A)	2 (B)	3 (C)	4 (D)	5 (E)	VERY LIKE ME

28. You read to study for personal and occupational advancement.

VERY UNLIKE ME	1 (A)	2 (B)	3 (C)	4 (D)	5 (E)	VERY LIKE ME

29. You're very good at your job.

VERY UNLIKE ME	1 (A)	2 (B)	3 (C)	4 (D)	5 (E)	VERY LIKE ME

30. You're interested in your job.

VERY UNLIKE ME	1 (A)	2 (B)	3 (C)	4 (D)	5 (E)	VERY LIKE ME

31. Compared with others in your field, you have advanced more rapidly.

VERY UNLIKE ME	1 (A)	2 (B)	3 (C)	4 (D)	5 (E)	VERY LIKE ME

32. You don't like what you do on your job.

VERY UNLIKE ME	1 (A)	2 (B)	3 (C)	4 (D)	5 (E)	VERY LIKE ME

33. If a training program were available, and you could retain your salary, you'd change to a different occupation.

VERY UNLIKE ME	1 (A)	2 (B)	3 (C)	4 (D)	5 (E)	VERY LIKE ME

34. Compared to other people on your job, you handle reading tasks very well.

VERY UNLIKE ME	1 (A)	2 (B)	3 (C)	4 (D)	5 (E)	VERY LIKE ME

35. You tend to avoid reading job materials when you can get the information a different way.

VERY UNLIKE ME	1 (A)	2 (B)	3 (C)	4 (D)	5 (E)	VERY LIKE ME

36. You tend to avoid writing something if you can just tell someone the same thing.

VERY UNLIKE ME	1 (A)	2 (B)	3 (C)	4 (D)	5 (E)	VERY LIKE ME

37. How comfortable or uncomfortable are you with the various things you have to do on your job?

VERY UNCOMFORTAB.	1 (A)	2 (B)	3 (C)	4 (D)	5 (E)	VERY COMFORTABLE

38. How comfortable or uncomfortable are you with what you read on the job?

VERY UNCOMFORTAB.	1 (A)	2 (B)	3 (C)	4 (D)	5 (E)	VERY COMFORTABLE

39. How comfortable or uncomfortable are you with what you have to write on the job?

	1	2	3	4	5	
VERY UNCOMFORTAB.	(A)	(B)	(C)	(D)	(E)	VERY COMFORTABLE

40. As a reader, you consider yourself to be: (1) poor; (2) below average; (3) average; (4) above average; (5) excellent.

1	2	3	4	5
(A)	(B)	(C)	(D)	(E)

41. Compared to other people your age, your rate or speed of reading is: (1) poor; (2) below average; (3) average; (4) above average; (5) excellent.

1	2	3	4	5
(A)	(B)	(C)	(D)	(E)

42. Compared to other people your age, your understanding or comprehension of things you read is: (1) poor; (2) below average; (3) average; (4) above average; (5) excellent.

1	2	3	4	5
(A)	(B)	(C)	(D)	(E)

43. How enthusiastic are you about reading?

	1	2	3	4	5	
VERY UNENTHUSIAS.	(A)	(B)	(C)	(D)	(E)	VERY ENTHUSIASTIC

44. How important is reading to succeed in life?

	1	2	3	4	5	
VERY UNIMPORTANT	(A)	(B)	(C)	(D)	(E)	VERY IMPORTANT

45. What are the main types of reading that you do?
&
46. (Check off their main types. First choice: 45, second choice: 46. Do not read them the list.)

a. Job-related reading
b. Light book reading (novels & self-help)
c. Magazines
d. Newspapers
e. Textbook reading
f. Religious materials
g. Other (specify in notes. Non-fiction not job-related.)

47. During a usual day, the time you spend reading for your job is: _____ minutes.

48. During a usual day, the time you spend reading is _____ minutes.

I'd like to get examples of times now and when you started the job when you used printed materials in connection with carrying out some part of your job. (Give next sheet to interviewee to fill out.)

	SKILL USED	
	On job Presently	On this job at Entry
IN YOUR WORK, DO YOU READ:		
Notes, letters or memos?		
Forms (such as work orders, job orders, vouchers, claims, purchase orders)?		
Charts?		
Policy manuals, regulations, and instructions?		
DO YOU USE INFORMATION FROM BOOKS SUCH AS:		
Telephone Directories?		
Catalogs?		
Dictionaries?		
Technical References?		
Company Manuals?		
IN YOUR WORK, DO YOU WRITE.		
Notes, letters or memos?		
Forms such as work orders, job orders, vouchers, claims, purchase orders?		
Reports for superiors or others in your field?		
IN YOUR READING AT WORK, DO YOU HAVE TO:		
Use Directions?		
Find Out Facts?		
Find Out Opinions, Purposes, or Hidden Meanings?		
Use two or more books at a time to find out information?		
Compare references from two or more books and set a value judgement on the one to use?		
IN YOUR WRITING AT WORK, DO YOU HAVE TO:		
Report on what was accomplished?		
Generate plans for further work?		
State your opinions about some aspect of the job?		
Complete already prepared forms?		

I'd like to get examples of times during the last month or so when you used printed materials in connection with carrying out some part of your job. Could you give me an example? (Could you give me the exact name of this book/manual/etc.)?

NAME OF MATERIAL_____

2.1 TYPE: (A) Total book
(B) Part of book (text)
(C) Part of book(chart/table/diagram/map)
(D) Single to triple sheet text
(E) Single to triple sheet chart, etc.

--Why did you choose to read that particular material?
--How did you use that material in getting the information you needed?
--(Opt.) What was your purpose in reading this material?

2.2 If you had to do exactly the same task tomorrow, would you have to read this material again?

a. No b. Maybe c. Yes

--(Opt.) Did you learn something from this material?
--How did you learn the material?

(USE ABOVE QUESTIONS TO CODE THE FOLLOWING:)

2.3 Reading to learn task: (to know; never read again)
(A) reread/rehearse
(B) problem solve/question
(C) relate/associate
(D) focus attention, concentrate

2.4 Reading to do task (no learning):
(A) fact-finding in text
(B) fact-finding in charts, graphs, tables, maps
(C) following directions using text
(D) following directions using charts, else.

2.5 Reading to do task (with learning):
(A) special learning strategy (2.3 A, B, C, D)
(B) repetition of reading task over days or months
(C) single-trial learning: application of information "fixed" it
(D) other (specify)

2.6 Reading to Assess:
(A) usefulness for a particular task
(B) whether to read more carefully later
(C) whether to pass material on to someone else
(D) other (specify)

ROLE-PLAYS (OPT. -- Use if more info needed)
Hand individual material he uses on the job.

1a. Tell me how you would use this material on your job. (elicit responses such as: "I'd use it to find. . ." "I'd use it to order. . .")
b. How would you use this material to find X (or to order Y)? Show me how you'd do it.
c. How often, during the last month, have you done this?
2a. I'd like you to imagine that I'm a new person on your job (in your field). This reading material is information I need to be familiar with. Tell me how I should go about getting the needed information from this book (chart, etc.).

2.7 What would be the consequences if you made a mistake in reading this material?"

(A) Not important to task (B) Important, but not vital (C) Vital to completion of task

2.8 How often do you use this material?

(A) Less than once a month
(B) About once a month
(C) Once a week to once a month
(D) Daily to once a week

Now I'd like to get some examples of writing you have to do. Could you give me some instances when you had to write something on your job in the last month or so?

What exactly did the writing task involve?

3.1 TYPE OF TASK

(A) Fill out form
(B) Write letter, memo
(C) Write report or articles for others
(D) Note work accomplished
(E) Other (specify) _____

3.2 What would be the consequences if you made a mistake writing this material?

(A) Not important (B) Important but not vital (C) Vital

3.3 How often do you do this type of writing?

(A) Less than once a month
(B) About ance a month
(C) Once a week to once a month
(D) Daily to once a week

ALTERNATIVE SOURCES

Now I'd like you to give me some instances when you asked someone else for job-related information in the last month or so. Can you give me an example?

3.16 Was this information also contained in a book, manual, or other print that you could use? (If "don't know," mark "no.")

(A) No (B) Yes

3.17 What book (manual, etc.) contained the information? Why did you choose to ask rather than read it?

(A) to be sociable; to talk with someone
(B) part of the reading/writing task was unclear
(C) was unable to read or write material (or parts of it)
(D) the reading/writing was dull
(E) more efficient to ask someone

3.18 How often do you ask others for this sort of information?

(A) Seldom
(B) Once a month
(C) Once a week to once a month
(D) Daily to once a week

3.31 If we took the materials you mentioned as having to read and write on your job, and gave them to seniors in high school, would most of the students, without special training, be able to handle it?

(A) Yes (B) No (C) Other

3.32 What would give them the most trouble? (Write out response)_____

_____

3.33 (If answer to above was "Yes.") What about middle school students. Would they be able to handle it?

(A) Yes (B) No (C) Other

3.34 What would give them the most trouble? (Write out response)_____

_____

"This lake is all treated sewer water," the old gentleman murmured in admiration. The old man sat on a bench as close to the bank as possible with his elbows resting on his knees while gazing at the rippling water. The breeze sweeping across the lake caused the sailboats to glide along with amazing speed.

"We are making great _____(1)_____ strides," he thought to _____(2)_____. He knew well the _____(3)_____ of this remarkable lake _____(4)_____ in the foothills of _____(5)_____ California. He swelled with _____(6)_____ to recall the wise _____(7)_____ the Santee citizens had _____(8)_____ when they elected not _____(9)_____ join the metropolitan sewage _____(10)_____ _____ where the waste would _____(11)_____ been discharged into the _____(12)_____ _____ with only inadequate primary _____(13)_____. Rather, the residents constructed _____(14)_____ own sewage facility, reclaiming _____(15)_____ sewer water, thus extending _____(16)_____ own supply to provide _____(17)_____ needs and clean recreational _____(18)_____.

"This is probably the _____(19)_____ city park in the _____(20)_____ which is built just _____(21)_____ downstream from a sewer _____(22)_____," the gentleman thought. He _____(23)_____ forward scooping up a _____(24)_____ of water. "This lake _____(25)_____ more sanitary than most _____(26)_____ streams."

KEY:

(1) ecological	*(9) to*	*(17) water*	*(25) is*
(2) himself	*(10) system*	*(18) extras*	*(26) mountain*
(3) story	*(11) have*	*(19) only*	
(4) nestled	*(12) Pacific*	*(20) world*	
(5) Southern	*(13) treatment*	*(21) miles*	
(6) pride	*(14) their*	*(22) plant*	
(7) choice	*(15) the*	*(23) leaned*	
(8) made	*(16) their*	*(24) handful*	

APPENDIX B

Explanation of Dictionary of Occupational Titles (Department of Labor, 1978) Numbering Systems: Occupational Level and Responsibility of Job

APPENDIX B

The Dictionary of Occupational Titles (DOT, 1978) is a listing of almost all occupations in the American work force. Each occupation is described in terms of tasks performed, and each occupation is assigned a nine-place number.

The first three digits of the number define a particular occupational group. The first digit is a broad classifier (e.g., 2 = clerical and sales occupations; 8 = structural work occupations). The second and third digits divide broad classifications into more specific groupings (see examples on following page). Thus, the first three digits define categories, divisions, and groups of occupations. The last three digits serve as identifiers for specific occupations within groups.

The middle three digits describe the responsibility of the job. Digit 4 describes responsibility with data, digit 5 describes responsibility with people, and digit 6 describes responsibility with things. Each digit is assigned a number based on the complexity of the job responsibility as follows:

	4th Digit (Respons. w/Data)	5th Digit (Respons. w/People)	6th Digit (Respons. w/ Things)
More Complex	0 = Synthesizing	0 = Mentoring	0 = Setting Up
↑	1 = Coordinating	1 = Negotiating	1 = Precision Working
	2 = Analyzing	2 = Instructing	2 = Operating/Controlling
	3 = Compiling	3 = Supervising	3 = Driving/Operating
	4 = Computing	4 = Diverting	4 = Manipulating
	5 = Copying	5 = Persuading	5 = Tending
	6 = Comparing	6 = Signaling/ Speaking	6 = Feeding
		7 = Serving	7 = Handling
↓		8 = Taking Instruction/Helping	
Less Complex			

In this study the "job responsibility" variable was created by transposing the number values (e.g., 0 = 10; 1 = 9, etc.) and adding the 4th and 5th digit values. Additionally, the variable "occupational level" was created using the first of the nine digits in each DOT number.

Representational Listing of Occupational Categories, Divisions, and Groups

Occupational Categories

0/1	Professional, technical, and managerial occupations	First Digit
2	Clerical and sales occupations	
3	Service occupations	
4	Agricultural, fishery, forestry, and related occupations	
5	Processing occupations	
6	Machine trades occupations	
7	Benchwork occupations	
8	Structural work occupations	
9	Miscellaneous occupations	

Two-Digit Occupational Divisions

00/01	Occupations in architecture, engineering, and surveying	First Two Digits
07	Occupations in medicine and health	
13	Occupations in writing	
18	Managers and officials	
20	Stenography, typing, filing, and related occupations	
23	Information and message distribution occupations	
26	Sales occupations, consumable commodities	
30	Domestic service occupations	
34	Amusement and recreation service occupations	
37	Protective service occupations	
40	Plant farming occupations	
44	Fishery and related occupations	
45	Forestry occupations	

Three-Digit Occupational Groups

007	Mechanical engineering occupations	First Three Digits
024	Occupations in geology	
055	Occupations in anthropology	
078	Occupations in medical and dental technology	
091	Occupations in secondary school education	
102	Museum curators and related occupations	
137	Interpreters and translators	
141	Commercial artists: designers and illustrators, graphic arts	
162	Purchasing management occupations	
181	Mining industry managers and officials	
193	Radio Operators	
198	Railroad conductors	
203	Typists and typewriting machine operators	

APPENDIX C

Categories for Literacy Strategies

Explanations of "General Strategies" (e.g., "Read-to-Do") and "Specific Strategies" (e.g., "Fact-Finding, Using Text")

APPENDIX C
Categories for Strategies

Subjects cited and described up to five reading tasks performed as part of their jobs. These reading tasks were categorized into "strategies" based on the purpose (e.g., read-to-do) and on the processes used (e.g., reread/rehearse). The categories for strategies used, and their descriptions, follow:

A. Reading-to-learn tasks (in which the individual applies strategies designed to ensure retention of material read). (These categories are from research done by Sticht et. al., 1976; Sticht, 1978)

1. Reread/Rehearse (involves repeating the processing of intormation taken from the text, with minimal elaboration or transformation)
2. Problem Solve/Question (involves answering text questions, solving problems in the text . . .)
3. Relate/Associate (involves the use of mnemonics; discussion of material; associations of new information with other information; elaboration)
4. Focus Attention (involves activities which reduce the amount of information in some manner, e.g., underlining . . . outlining, taking notes) (Sticht, 1978, p. 15)

B. Reading-to-do tasks (with no incidental learning) (involves using material as a reference or "exterior memory" for completing a task) (categories adapted from Sticht, 1978)

1. Fact-finding in text

2. Fact-finding using charts, graphs, tables, etc.

3. Following directions using text

4. Following directions using charts, graphs, tables, etc.

C. Reading-to-do tasks with incidental learning (involves using material as a reference to complete a task, but learning the material in the process so that the material ceases to function as "external memory")

1. Use of special study strategy (like ones mentioned in A, e.g., re-read/rehearse, focus attention, etc.)

2. Repitition of reading tasks over days or months caused learning to occur (several trial learnings)

3. Application of the reading information to a job task once caused learning to occur (single trial learning; e.g., a worker reads directions, does the task, and henceforth remembers how to do the task without referring back to the directions)

D. Reading to assess (involves strategies aimed at quickly going through material in order to reach decisions about its use) (categories based on field-testing of survey)

1. Assessing usefulness for a particular task

2. Assessing whether to read the material more carefully later (or to use the material later to help prepare reports, etc.)

3. Assessing whether to pass the materials on to someone else

4. Other

APPENDIX D

ANOVA and Student t Test Results for Variables of "Literacy Demand" by Occupational Success Groupings; Summary of Analyses for Hypothesis One

TABLE D-1

Scope of Literacy Demands on Job					
ALL CASES	N	Mean	s. d.	F-ratio	Student t compar.
INCOME					1, 2> 3, 4****
1) above $19, 800	25	17.6	4.5		1 >3***
2) 13-19, 800	23	15.3	4.2	11.332***	1>4***
3) 8, 100-12, 900	24	11.0	5.9		2>3**
4) less than 8, 100	25	10.0	6.1		2>4**
JOB STATUS					1, 2 >3, 4****
1) above 60	25	17.9	4.4		1 >2*
2) 50-60	32	14.4	5.4	13.70***	1>3*
3) 40-49	13	14.0	4.2		1>4***
4) less than 40	35	9.2	6.1		2>4*
					3>4*
OCCUPATIONAL LEVEL					
1) professional, technical, managerial	33	17.9	4.1	12.147***	1, 2>3, 4*** 1>2*** 1>3***
2) clerical, sales	33	13.2	5.5		1>4***
3) service occupa.	6	10.3	5.2		2>4*
4) "blue collar"	27	10.1	6.1		

*p <.05 **p <.01 ***p <.001

TABLE D-2

Depth of Literacy Demands on Job					
ALL CASES	N	Mean	s. d.	F-ratio	Student t compar.
INCOME					1, 2>3, 4****
1) above $19, 800	25	11.72	4.82		1>3**
2) 13-19, 800	23	11.10	4.95	11.149***	1>4***
3) 8, 100-12, 900	25	7.52	3.95		2>3**
4) less than 8, 100	25	5.24	4.42		2>4***
JOB STATUS					1, 2>3, 4****
1) above 60	25	13.3	3.8		1>2***
2) 50-60	32	9.0	4.6	18.399***	1>3*
3) 40-49	13	10.1	4.5		1>4****
4) less than 40	36	5.3	4.4		3>4**
OCCUPATIONAL LEVEL					
1) professional, technical, managerial	33	12.97	3.72	12.370***	1, 2>3, 4***
2) clerical, sales	33	8.30	5.21		1>2***
3) service occupa.	6	4.50	3.89		1>3***
4) "blue collar"	28	6.89	4.80		1>4***

*p <.05 **p <.01 ***p <.001

TABLE D-3

Reading Difficulty (Grade Equivalencies) of Job Materials					
ALL CASES	N	Mean	s. d.	F-ratio	Student t compar.
INCOME					
1) above $19, 800	9	10.9	1.3		
2) 13-19, 800	15	11.0	1.3	2.218	3>4**
3) 8, 100-12, 900	15	11.4	.7		
4) less than 8, 100	16	10.3	1.4		
JOB STATUS					
1) above 60	13	11.2	1.5		
2) 50-60	18	11.1	.9	.9483	n. s.
3) 40-49	11	10.9	.9		
4) less than 40	16	10.5	1.4		
OCCUPATIONAL LEVEL					
1) professional, technical, managerial	19	11.0	1.2	5.754*	1>3**
2) clerical, sales	18	11.2	.8		2>3***
3) service occupa.	6	9.2	1.2		4>3**
4) "blue collar"	13	11.2	1.2		

*p <.05 **p <.01 ***p<.001

TABLE D-4

Amount of Time Reading on the Job Per Day					
ALL CASES	N	Mean	s. d.	F-ratio	Student t compar.
INCOME					
1) above $19, 800	25	117.0	99.9		1, 2>3, 4*
2) 13-19, 800	23	168.3	148.7	2.542	2>3*
3) 8, 100-12, 900	25	84.4	83.8		2>4*
4) less than 8, 100	26	90.4	127.3		
JOB STATUS					
1) above 60	25	140.8	114.1		
2) 50-60	33	112.6	114.8	.694	2>4***
3) 40-49	13	99.2	85.7		
4) less than 40	36	98.1	136.7		
OCCUPATIONAL LEVEL					
1) professional, technical, managerial	33	127.7	103.1	5.025**	1>2, 3, 4*
2) clerical, sales	33	163.0	150.2		1, 2>3, 4
3) service occupa.	6	84.2	137.6		1>4**
4) "blue collar"	29	53.1	65.3		2>4***

*p <.05 **p <.01 ***p <.001

TABLE D-5

Variety of Strategies Used in Job Literacy Situations					
ALL CASES	N	Mean	s. d.	F-ratio	Student t compar.
INCOME					
1) above $19, 800	25	9.48	2.33	4.404**	1, 2>3, 4**
2) 13-19, 800	22	8.68	2.85		1>3**
3) 8, 100-12, 900	24	7.08	2.32		1>4**
4) less than 8, 100	26	7.19	3.39		2>3*
JOB STATUS					
1) above 60	25	10.1	2.3		1, 2>3, 4***
2) 50-60	31	8.2	2.8	11.235***	1>2**
3) 40-49	11	8.7	1.6		1>4***
4) less than 40	37	6.4	2.7		3>4**
OCCUPATIONAL LEVEL					
1) professional, technical, managerial	32	9.38	2.60	3.382*	1, 2>3, 4*
2) clerical, sales	32	7.78	2.39		1>2*
3) service occupa-	6	8.00	2.37		1>4**
4) "blue collar"	28	7.21	3.33		

*p<.05 **p<.01 ***p<.001

APPENDIX E

Multiple Regression Analysis with Composite, Factor Weighted Score of Occupational Success as Dependent Variable and All Variables in the Literacy "Model" as Independent Variables

(Variables Entered Stepwise)

TABLE E

Multiple Regression Analysis with Composite, Factor Weighted Score of Occupational Success as Dependent Variable and All Variables in the Literacy "Model" as Indpenedent Variables (Variables Entered Stepwise)

Step Ent'd	Variabies	N	Mean	F to enter or remove	Significance	Multiple R	R Square	R Square Change	Simple R	Overall F
1	Depth of Dem's	106	8.95	13.767	.001	.555	.308	.308	.555	13.767**
2	Job Cloze Score	35	12.36	4.245	.048	.627	.393	.056	.387	9.727**
3	Diff. of Mater.	58	10.92	5.669	.024	.702	.493	.099	.326	9.383**
4	Var. of Strat's	104	8.05	5.299	.029	.757	.573	.081	.462	9.408**
5	Gen. Cloze Sc.	100	10.59	2.822	.104	.783	.614	.040	.169	8.579**
6	Intens. of Motiv.	106	19.37	2.149	.155	.802	.643	.030	.227	7.811**
7	Job Rdg. Intst.	107	13.22	2.682	.114	.823	.678	.035	-.044	7.512**
8	No. Strategies	106	10.75	1.956	.175	.838	.702	.024	.305	7.069**
9	Scope of Dem's	105	13.47	2.392	.136	.855	.730	.028	.525	6.914**
10	Job Rdg. Time	107	8.98	2.252	.148	.869	.755	.025	.273	6.786**
11	Job Int. / Attit.	105	9.38	.658	.426	.873	.763	.007	.072	6.133**
12	Gen. Rdg. Attit.	105	67.59	.687	.417	.879	.771	.008	.261	5.595**
13	Alt. Strat's Used	104	2.50	.280	.603	.880	.774	.003	.114	5.000**
14	Gen. Rdg. Time	107	195.25	.016	.900	.880	.774	.000	.113	4.404**

Variables in the Equation

Variable	B	Std. Error B	F	Beta	Standard Error of Equation
Depth of Demands	.5796	.2344	6.1142*	.3369	
Job Cloze Score	.1108	.4485	6.1050*	.3179	
Difficulty of Material	.2796	.9768	8.1955**	.3664	
Variety of Strategies	.9965	.4329	5.2995*	.3126	
(Constant)	-5.7390	1.3014	19.4478		

*p<.05 **p<.01

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