

**An Investigation of On-The-Job Reading Tasks of Apprentices  
in Seven Designated Construction Trades in Manitoba**

**Thesis**

**Presented in Partial Fulfillment of the Requirements for the Degree  
of**

**Master of Education**

**April, 1991**

**by**

**Janis McKeag**

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AN INVESTIGATION OF ON-THE-JOB READING TASKS OF  
APPRENTICES IN SEVEN DESIGNATED CONSTRUCTION TRADES  
IN MANITOBA

BY

JANIS MCKEAG

A thesis submitted to the Faculty of Graduate Studies of  
the University of Manitoba in partial fulfillment of the requirements  
of the degree of

MASTER OF EDUCATION

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## DEDICATION

I would like to dedicate this work to my parents,

Dawn and Jack McKeag.

## ABSTRACT

The study was designed to investigate the on-the-job reading tasks of apprentices in seven designated construction trades in Manitoba. The purpose of the study was to determine the frequency, importance, and training emphasis of on-the-job reading tasks for entry and advanced level apprentices during the on-the-job training component of their apprenticeship program. Twenty on-the-job reading tasks were identified for use in the development of an instrument designed to assess apprentices' perceptions on frequency of use and importance for each task. The survey was sent to a random sample of a 190 apprentices, representing all levels in the trades of: cabinetmaker, carpenter, construction electrician, power electrician, plumber, steamfitter, and sprinkler and fire protection installer. Eighty-eight apprentices responded for a 53% return rate from the accessible sample. The data was processed and analyzed using FASTAT for the Mac program. The frequency of use and importance were used to establish training emphasis. Entry level apprentices identified six frequently used reading tasks; advanced level, eight. All but two tasks were found to be important for both groups. Training emphasis was determined for all reading tasks.

Two major conclusions drawn from the results were : (1) on-the-job reading tasks vary according to frequency of use and importance for entry and advanced level apprentices, and (2) both frequency and importance, must be considered for the determination of training emphasis.

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# CHAPTER I

## INTRODUCTION

### Significance of Study

Technology is affecting the demands placed on workplace participants and the skills needed by them to meet the new and changing requisite skills of almost all occupations. The Ontario Ministry of Skills Development (1989) estimates "that almost two-thirds of the workforce will experience a 20-30 percent increase in information requirements on the job" (p. 1). Between now and the year 2000, it is predicted that almost half of the new jobs in the fields of engineering, construction, recreation, agriculture, product fabrication, and machining, will require more than 5 years of combined education and training beyond the completion of high school (Success in the Works, 1989a). Therefore, one of the most valuable future commodities for business and industry will be a competent, skilled and literate employee. (CPD Group Ltd., 1989; Leitch, 1990; Mauro, 1990).

This demand and need for skilled, literate employees is magnified by concern about the problems of literacy in the workplace and technology's impact on the reading demands of different occupations and the growing gap between the two (Chang, 1983; Derby, 1987; Edwards & Gould, 1987; Evetts & Flanagan, 1990; Litchfield, 1991; Mikulecky, 1987; Stedman & Kaestle, 1987; Taylor & Lewe, 1990).

In Canada, the cost of occupational illiteracy to society and industry, in terms of human resources, lessened productivity, work-related accidents, and difficulties in introducing new technology, is estimated at \$4 billion a year (Des Lauriers, 1989; Janoff, 1988).

With an estimated one in six Canadian workers functionally illiterate, government agencies, business, industry, community groups, and educators are becoming aware of the need to develop and revise educational programs and training to equip workers for the literacy demands of the workplace (Calamai, 1987; Cornell, 1988; Des Lauriers, 1989; Litchfield, 1991; Philippi, 1988; Taylor & Lewe, 1990). Studies indicate there is a need to better prepare workers for the actualities of the workforce by using real-life materials during preparatory training (Chang, 1983; Taylor & Lewe, 1990; Thorton, 1980). If the literacy/reading component of vocational education and training is to be effective, then the real world reading demands of the workplace, must be included in the curricula (de Grandpré 1989; Thorton, 1980; Waugh, 1990).

While skill training with tools, machines and processes has been the focus of vocational training programs, not as much attention has been paid to the "academic" skills, reading, mathematics and communications, needed to carry out job tasks (Smith, 1979).

"Reading skill is both a prerequisite to and component of the pre-employment training phase in which the skills and knowledge of the occupation are imparted to the prospective job incumbent" (Chang, 1983, p.12). The opportunity to learn manual skills in a more

concrete "hands-on" environment presented in vocational education is one of its strengths, yet the use of a variety of reading materials as an essential component of these programs is often overlooked (CPD Group Ltd., 1989; Manitoba Education and Training, 1988).

Siedow (1983) states there exists an erroneous assumption that vocational education requires little or no reading and therefore students experiencing difficulties in reading should be assigned to vocational courses. Students suffering from the same impression that industrial, technical and vocational courses require little or no reading, will opt for these programs to avoid having to read (Lee, 1981; Mikulecky & Diehl, 1983; Myers, 1984).

This assumption can be dispelled by examining some general occupational literacy competencies. These competencies go beyond simple reading ability, to include the ability to read and interpret job-related materials and to be able to apply these to work situations. Workers are expected not only to understand the information, but also to be able to use it to carry out their job duties. The literacy skills will vary from occupation to occupation. The technical language of occupations is diverse, including not only special vocabulary, but symbols, abbreviations, format, and structure (Hutson, 1982; Incardone, 1978; Lee, 1981). "Each occupation has a specialized vocabulary essential to understanding, learning, and communication" (Rush, Moe, & Storlie, 1986, p.63). Additionally, vocabulary can have the added factor of being of 'the third kind' where "rather common words assume an uncommon meaning in a

specific vocational context" (Stammer, 1983, p. 72). Thus it can be seen that the occupational literacy skills are multifaceted and revolve around the application of information, obtained from a variety of print materials, presented in differing formats.

Furthermore, assumptions have been made about the reading levels of industrial and technical material. The reading material used in industrial/ vocational courses is written at a higher level than one might think (Evetts & Flanagan, 1990). There is a high level of difficulty and complexity of job-related reading materials which are increasingly being written at a higher level with more technical information (Noe, 1983; Pellegrino, 1988; Sticht & Mikulecky, 1984).

The technical definition of reading grade level (RGL) of materials is "that grade at which the average student can understand 75 percent of what is presented" (Stedman & Kaestle 1987, p.37). Clark (1978) examined the readability level of 25 industrial arts textbooks and found that they vary from 9.3 to 13.3 with a mean level of grade 11. Evetts and Flanagan (1990) reported that the New Brunswick Piping Trades Association (NBPTA) found the readability level for code books and texts tended to be greater than 12 to 13. Mikulecky (1982) found that the average reading level was 11.5 for work material and 11.3 for school material. In contrast, one study indicates that the average reading level of students entering vocational-technical programs is grade 6.5 (Pellegrino, 1988). This indicates an average potential gap of 5 reading grade levels. However, successfully completing a certain grade does not

necessarily mean that an individual can read at that level, some may read at a higher level, some at a lower (Mikulecky, 1984; Stedman & Kaestle, 1987; Taylor & Lewe, 1990).

A similar reading level gap may exist in Manitoba. According to the Southam News Survey (Calamai, 1987), one-third of the five million functionally illiterate Canadians are high school graduates. Completion of high school does not guarantee adequate occupational literacy levels. "Construction and manufacturing are noted as having the highest rates of illiteracy by function of occupation" (Waugh, 1990). Of the designated construction trades in Manitoba, the grade level requirements vary from Grade 9 to Grade 11. If the technical reading material for construction apprentices is, on the average, written at a Grade 11 level, then there may be a gap between the actual and required reading ability of apprentices for occupationally related documents.

Therefore, the potential for gaps to exist between the demands of reading materials used in vocational programs and the students reading ability is high. If organizations continue to make mistaken assumptions about reading demands in vocational programs in spite of evidence to the contrary, the gap between the real reading demands of occupations and the preparatory vocational training will continue to grow. "Today, most skills are outdated every five years on average" (Litchfield, 1991, p.58).

One possible way to reduce gaps between preparatory training and employment for an occupation is to identify the specific job-

related materials and use these in pre-employment training.

"Attempts to isolate the kinds of materials that people read on the job, the interaction between the reader and the document and the variety of strategies people use in reading that document will lead to more relevant, practical reading programs" (Jacob & Crandall 1979, p.9).

This examination of the interaction between material, reader and strategies has been the focus of a number of occupational literacy studies: Sticht (1978), Mikulecky and Diehl (1980), Mikulecky (1982), Kirsch and Guthrie (1984), and Rush, Moe, and Storlie (1986). Taylor and Lewie (1990), presented three case studies of literacy task analysis approaches. "Literacy task analysis is the defining of the literacy elements required to do specific jobs" (Taylor & Lewie, 1990, p. 42). After each analysis, the results were examined in light of the Basic Skill Profile which had been developed for this study. One method determined task criticality (frequency, importance and difficulty) of major tasks. In the second method, the difficulty of evaluating prior knowledge was revealed. The third method, according to the authors, yielded some important information, but more work is needed "to test the true applicability of the method" (Taylor & Lewie, 1990, p.92). While these studies add to our knowledge of literacy demands of different occupations and the need to include work-related materials in vocational preparation, their samples may not be applicable to apprentices in construction trades.

Other research efforts have more relevance for determining the reading demands of construction apprentices. Smith (1973) examined reading demands for some occupations (plumber, electrician, painter, carpenter, and labourer) in the construction cluster. In this study, the variety of reading materials and the need to comprehend factual information from the material were identified as important reading demands. An investigation into the curricular and occupational reading of apprentices and journeypersons in the plumbing trade in Alberta was conducted by Chang (1983). In this study it was found that differences do exist between curricular and occupational reading demands. It was further identified that reading is an important occupational skill and as such has implications for the preparatory vocational training curriculum. Edwards and Gould (1987) researched the self-perceived reading needs of electrical mechanic apprentices in Australia. The results indicated that apprentices use a wide range of reading tasks to locate information needed to carry out job-related duties quickly and accurately. It was indicated that this may have implications for pre-vocational testing and for curriculum. Waugh (1990) conducted a feasibility study for the Carpenters' Union in Toronto, in which literacy skills barriers were identified. These included the inability to fill out application and other forms, to read promotional materials and to understand safety signs written in English. Blueprint reading and level of education were also mentioned as potential barriers. Knowledge of trade-specific language and the ability to understand instructions,

especially in training, were identified by the majority of the participants as problem areas (Waugh, 1990).

Notwithstanding the problems of generalizability to construction apprentices in Manitoba, the studies indicate that to bridge the gap between reading in preparatory vocational education and the real world of work, the actual job-related reading tasks must be identified. This would permit the customizing of training curricula to match the real job demands (Taylor & Lewe, 1990). In Manitoba, the Apprenticeship and Training Branch of the Department of Labour, has expressed concern about the gap between on-the-job reading demands of apprentices, their preparatory vocational training and the entrance requirements. "There are gaps between the reading, writing, comprehension and numeracy capabilities of applicants despite documented (transcripts) proof of academic prerequisites. To date, no defined attempt has been made in Manitoba to carry out such research" (M. Kenny, Director Apprenticeship and Training, personal communication, July 23, 1990).

A first step to identify reading demand gaps is to assess the workplace reading demands of apprentices, by asking the apprentices themselves which skills they use are important (Lewe, 1989; Ontario Ministry of Skills Development, 1989; Taylor & Lewe, 1990). Potential differences between entry level and advanced level apprentices for on-the-job reading tasks must also be highlighted in order to tailor training components of apprenticeship. Entry level apprentices tend to refer to work-related materials more often than

advanced level apprentices nearing completion of their program. (Chang, 1983; Taylor & Lewie, 1990). Furthermore, it is assumed that advanced level apprentices are more independent and can solve problems on their own, as reflected in the ratios of journeypersons to apprentices. The ratio of one to one for first and second level apprentices, may be reduced to one to three for third, fourth and fifth level apprentices (M. Kenny, Director of Apprenticeship and Training).

This study was designed as an effort to assess the current self-perceived, on-the-job reading demands of construction apprentices. It examined the frequency and the importance of on-the-job reading tasks of construction apprentices in Manitoba. From this, training emphasis for each on-the-job reading task was determined. The apprentices in this study represented seven designated construction trades in Manitoba : cabinetmaker, carpenter, construction electrician, power electrician, plumber, steamfitter, and sprinkler and fire protection installer.

### Statement of the Problem

Employees lacking necessary literacy skills are creating problems for business and industry in many ways. These include problems with introducing new technologies, lessened productivity, and work-related accidents. With an estimated one in six Canadians functionally illiterate, there is increasing awareness on the part of government, business, industry, and educational institutions of the need to design work-related literacy programs (Janoff, 1988; Des Lauriers, 1989).

In Manitoba, there are serious and unresolved concerns about requisite literacy skills in apprenticeship training programs. Gaps between the reading capabilities of applicants and the required academic prerequisites have been noted (M. Kenny, Director Apprenticeship and Training, personal communication, July 23, 1990). Little is known about the on-the-job reading tasks of apprentices in the construction trades in Manitoba so that they may be included in training components of apprenticeship programs.

An important first step in this endeavour was to establish an initial data base for on-the-job reading tasks of apprentices in seven designated construction trades. The data generated by this study could assist the Manitoba Departments of Labour and Education and Training in improving the content of their current vocational and apprenticeship programs to better meet workplace reading demands. The resulting modifications could then, hopefully in some small way, assist vocational education instructors in providing literate employees for the construction trades.

### Purpose of the Study

The purpose of this study was to investigate the on-the-job reading tasks of apprentices in seven designated construction trades in Manitoba. The scope of the study is, therefore, described within the following research questions.

1. With what **frequency** do entry and advanced level apprentices perform identified on-the-job reading tasks during their on-the-job component of their apprenticeship training ?
2. What are the opinions of entry and advanced level apprentices regarding the **importance** of identified on-the-job reading tasks during their on-the-job component of their apprenticeship training?
3. What should be the **training emphases** of the identified on-the-job reading tasks for entry and advanced level apprentices ?
4. What **differences** exist between the perceptions of entry and advanced level apprentices concerning the frequency of on-the-job reading tasks, and the importance of on-the-job reading tasks?

### Assumptions

The following assumptions were made in relation to this study:

1. that reading does occur on-the-job, and
2. that apprentices would follow the instructions for completing the questionnaire.

### Delimitations

Specifically, the investigator imposed the following delimitations:

1. The participants, randomly selected for this study, were composed of apprentices currently registered, as of June 1990, with the Manitoba Apprenticeship and Training Branch in the seven designated construction trades.
2. The study was further confined to seven designated trades in the construction area as defined by the Apprenticeship and Trades Qualifications Act §§ A110-1 (1987).

### Limitations

The limitations which were inherent in this study were:

1. Apprentices may not have completed the questionnaire under optimal conditions,
2. Apprentices often lacked the ability to identify specific on-the-job reading tasks.

## Definition of Terms

The following definitions were employed for the purpose of this study:

**Designated Trade:** an occupation designated by the Minister as being appropriate for either apprenticeship or certification or both; (The Apprenticeship and Trades Qualifications Act §§ A110-1 (1987) of Manitoba, p.1);

**Apprentice:** a person of at least 16 years of age, who enters into a written agreement with an employer to learn a designated trade requiring a minimum of two years of reasonably continuous employment, which provides practical experience and related technical instruction for that person (The Apprenticeship and Trades Qualifications Act §§ A110-1 (1987) of Manitoba, p.1);

**Entry Level Apprentice:** an apprentice currently registered in either the first or second level of training;

**Advanced Level Apprentice:** an apprentice currently registered in either third, fourth or fifth level of training;

**Literacy:** the ability to effectively read, write, comprehend, and use print information and material in a variety of life situations;

**Occupational literacy:** those reading skills necessary to decode, process, comprehend, and apply work-related print materials normally encountered in actual on-the-job situations. (Chang, 1983; Edwards & Gould, 1987; Diehl & Mikulecky, 1980; Rush, Moe, & Storlie, 1986; Stedman & Kaestle, 1987);

**Reading Demand:** the activities and operations required to process the information presented in material used in the job setting ;

Reading Task: (determined by the interaction between the material and the user) the processing demands and reading demands likely to be required to obtain the necessary information from the text required for satisfactory job performance (Kirsch & Guthrie, 1984a);

Reading Document: the formatted text containing material to be read for job completion;

On-the-Job Reading Task: a reading document which is encountered during work and is necessary for completion of job-related tasks and duties;

Self-Perceived On-the-Job Reading Tasks: on-the-job reading tasks which apprentices identify that they carry out during their actual workplace based, practical and technical training time;

Frequent On-the-Job Reading Tasks: an on-the-job reading task was deemed frequent, if its mean, on a Likert-type scale, was  $\leq 3$ . This indicated that the task was used at least on a once a week basis (see response scale on page 49);

Important On-the-Job Reading Tasks: an on-the-job reading task was deemed important if its mean, on a Likert-type scale, was  $\leq 2$ . This indicated that the respondents considered the task either very important or important (see response scale on page 49);

Training Emphasis: a training emphasis identifies those on-the-job reading tasks for which over-training, in-depth training, or no training should be offered in a preparatory program. This is a slight modification of the scheme proposed by Sage and Rose (1985).

## CHAPTER II

### REVIEW OF RELATED LITERATURE

#### Introduction

Literacy in the workplace is a topic of growing concern. Studies have examined the issue both in terms of cost and specific occupational demands. Reading in the work place is an essential occupational skill based on the relationship between reading demands, reading tasks, material presented in documents and the reader. Differences between in-school or curricular reading demands and on-the-job or occupational demands do exist. The range of materials used in work-related reading and the problems of describing and estimating occupational reading demands using reading tasks have hindered efforts to delineate occupational literacy skills. In order to provide more realistic training, specific occupational reading demands and tasks must be examined. These issues and concerns have been the focus of a number of major research studies exploring the area of reading tasks in various occupational areas. However, more work needs to be done to narrow the gap between real-life work situations and preparatory occupational training.

### Cost of Literacy Problems

In the workplace, workers equipped with inadequate literacy skills are affecting Canadian business, and the resulting cost is enormous. It has been estimated that illiteracy costs business \$4 billion directly and \$10 billion to society in human terms: down time, accidents, product quality, and unemployment rates (Des Lauriers, 1989; Waugh, 1990). If work-related literacy problems are not addressed, the concern exists that the numbers of functionally illiterate individuals will continue to grow as workers need to cope with a rapidly changing and technologically oriented workplace. "With the growing sophistication of work, many occupations which previously were essentially 'manual' become increasingly 'mental', requiring higher mathematical and language skills as well as scientific and technical literacy" (de Grandpré, 1990, p. 27). Illiterate workers - one out of six in the labor force - will be hard hit by the need for greater analytical and communications (reading and writing) skills in most industries (Calamai, 1987, p. 37).

This concern about the cost of literacy problems in the workforce has prompted those business, industry, government agencies and educational institutes involved in occupational training to participate in and initiate studies dealing with work-related reading demands of workers.

## Reading in the Workplace

The area of reading in the workplace is worthy of exploration, for work-related reading may be the most prevalent type of reading done by adults in the workforce (Chang, 1983; Diehl & Mikulecky, 1980; Rush, Moe, & Storlie, 1986). "As an area of scientific investigation, reading in the workplace has become increasingly important in recent years due to the growing concerns of educators, employers, and citizens over the ability of students leaving high school to find, hold, and achieve in jobs." (Kirsch & Guthrie, 1984a, p. 213).

Studies of work-related literacy have led researchers to a number of conclusions: (a) reading and writing are almost universally required in work and occupational training, (Rush 1986b), (b) in almost all of the occupations workers are required to exercise approximately 2 hours of reading per day in order to carry out their duties (Diehl & Mikulecky, 1980), and (c) reading demands on the job are different from general reading (newspapers, magazines) and reading done in school (textbooks) in terms of frequency, complexity, purpose, and strategies used (Chang, 1983; NBPTA, 1990; Thorton, 1979).

It is this last area that is of interest for this study, because the capability to read, comprehend and use work-related materials is an occupational skill, needed to carry out the duties and tasks of an occupation (Chang, 1987b). A person studying for work must be familiar with the real world of work and be prepared for the

vocabulary and reading tasks of the occupation (Chang, 1987a; Jacob & Crandall, 1980; Mikulecky, 1987; Taylor & Lewe, 1990). Students in an occupational program must be able to read, comprehend and use textbooks and the various materials required in their occupational specialities (NBPTA, 1990; Thorton, 1980).

### Literacy

The term "literacy" is in a state of evolution as more is becoming known about the various reading demands of individuals and occupations. A common understanding of literacy is one's ability to read and write. The inadequacy of this definition for today's society is reflected in its use. In order to describe the reading, writing and comprehension demands of a specific field, the word is often coupled with an adjective.

Kirsch and Guthrie (1984) interpret reading as an activity conditioned by the situation in which it occurs with particular contexts giving rise to specific uses for the reader. Due to these differing situations, Stedman and Kaestle (1987) claim "literacy is not a single skill, but a set of skills that people have to varying degrees. Some people can read well in one context and not in another" (p. 10). The Manitoba Task Force on Literacy (1989) defines "literacy as the ability to read, write, comprehend and use mathematics adequately to satisfy whatever requirements the learner determines are important for his or her own life" (p. 2). For Pellegrino (1988),

literacy is "the ability to function successfully on a daily basis and to maintain employability in an increasingly technological society" (p. 89). The Conference Board of Canada defines literacy as "the ability to read and write to carry out work responsibilities and operational training in a satisfactory manner" (Des Lauriers, 1989, p. 36).

Statistics Canada (1990) defines literacy as " the information processing skill necessary to use the printed materials commonly encountered at work, at home and in the community" (p. 1).

For the purpose of this study, literacy was defined as the ability to effectively read, write, comprehend, and use printed information and material in a variety of life situations. However, this definition was limited to an examination of literacy within the context of reading demands and tasks, for it is the skill of reading which provides the base to carry out the other components of literacy: writing, comprehending, and use of material.

### Occupational Literacy

The study of occupational literacy has its roots in the field of functional literacy. Functional literacy is related to the use, demands, materials, settings, social context and interaction of the reader and the environment (Jacob & Crandall, 1980; Kirsch & Guthrie, 1984a; Rush, Moe, & Storlie, 1986). "These studies suggest that functional literacy is dependent both on the ability to decode relatively small and not necessarily connected chunks of text and on the knowledge

of how to apply the information gained to solve a problem." (Jones, 1990, p. 2). Hutson (1982) delineates this concept with "a work-related definition of functional literacy, emphasizing the skill ranges that require more than basic literacy and ability to deal effectively with specialized forms of literacy required to perform effectively on the job or during training " (p. 4). Since the workplace and corresponding occupations can be considered as a particular component of life in which individuals function, then occupational literacy can be considered as a separate component of the literacy movement (Taylor & Lewie, 1990).

Rush, Moe, and Storlie (1986) define occupational literacy as "the ability to competently read required, work related materials" (p. 10). Cornell (1988) states that "occupational literacy is a group of skills and knowledge needed to complete a job task" (p. 655). For the purpose of this study, occupational literacy was defined as the ability to decode, process, comprehend and apply work-related print materials encountered in actual on-the-job situations.

### Reading Demands, Reading Tasks, and Documents

Reading demands are multifaceted operations required of the reader in order to understand the material presented in documents. These demands are composed of specific types of materials, levels of difficulty, and strategies used to process information from the material. The variety, complexity, frequency, importance, readability

levels, vocabulary, content, application, and context of documents will influence the demands made of the reader (Chang, 1983; Chang 1987b; Kirsch & Guthrie, 1977-78; NBPTA, 1990; Philippi 1988).

Pugh and Ulijn (1981) provided an outline for examining reading demands based on the text (document), the reader and the task. The text should be examined in light of format and function, length, presentation of the information, language, vocabulary, syntax and intention. Readers must be investigated in terms of their purpose, motivation, and background knowledge. Reading styles and strategies and evaluation represent the tasks needed to be performed.

By using Pugh and Ulijn's (1981) parameters, occupational reading demands can be summarized in the following manner. On-the-job documents involve use of a variety of reading and print materials presented in different formats. They will vary in their complexity and the combination of presentations, such as graphs and paragraphs (Chang, 1983; Noe, 1983). Documents include: checklists, forms , work orders, reference manuals, graphs, schematics, operating manuals, handbooks, bills, invoices, directions, computer records, diagrams, charts, memos, tables, installation instructions, safety warnings, tool and equipment instructions, codes, specifications, medical contradictions, reports, and brochures (Chang, 1983; Edwards & Gould, 1987; Kirsch & Guthrie 1984a; Mikulecky, 1987; Noe, 1983; Rush 1986; Smith, 1979; Taylor & Lewe, 1990; Thorton, 1980; Waugh, 1990).

Occupationally related reading demands placed on a worker include background information such as specialized vocabulary and technical language. Demands will require the individual "to interpret and integrate printed, graphic, and physical information to materials, tools, and equipment" (Rush, Moe, & Storlie, 1986, p.46). These demands tend to be brief, to look up specific information for immediate use, to accomplish a job task, and to be integrated with other work related duties (Chang, 1983; Edwards & Gould, 1987; Diehl & Mikulecky, 1980; Mikulecky & Diehl, 1983; Myers, 1984; NBPTA, 1990; Stedman & Kaestle, 1987).

Reading tasks are the operations performed to obtain the necessary information from the text presented. It is this interaction between material and use which operationally defines a reading task and determines the processing demands and reading strategies (Kirsch & Guthrie, 1984a). Philippi (1988) developed a list of job specific reading processes and competencies commonly needed to perform job reading tasks. These include vocabulary, literal comprehension, comparing and contrasting, recognizing cause and effect, predicting outcomes, using charts, diagrams, and schematics, and inferential comprehension. The abilities to interpret symbols, abbreviations and codes used in the occupation can also be characteristics of reading tasks (Sticht, 1978). According to Edwards and Gould (1987), skimming and scanning skills form the basis for the operation most frequently performed by workers to locate required information quickly and accurately.

Reading material found in documents forms the basis of tasks and demands. To define a reading demand, one must be able to identify the reading tasks, the knowledge and the level of skill to perform those tasks (Taylor & Lewe, 1990). In order to define a reading task, the type of information sought and the type of display needs to be identified (Sticht, 1978). Thus to analyze occupational reading tasks and demands for a particular occupation or cluster of occupations, the important, frequently used and relevant documents and material must be identified. They can be analyzed to see what operations are performed to obtain the necessary information. Once the tasks are analyzed, the demands could then be examined. A common assumption in past studies was that the competencies as outlined by Philippi will be employed when workers read work-related documents such as have been described. It was then inferred that work documents represent job reading tasks. Taylor and Lewe (1990) defined these as literacy tasks. For this study, the term "on-the-job reading task" was employed to define work documents.

#### Curricular versus Occupational Reading Demands

Occupational literacy skills can be found both within the school setting and on the job. However, the demands for each of these settings will vary (Chang, 1983; Siedow, 1983). Curricular literacy demands can be viewed as the reading of textbooks and other such

educational literature done primarily to obtain literal facts, while occupational literacy demands involve the reading of a variety of literature sources pertaining to an occupational speciality done to solve problems and provide services (Taylor & Lewe, 1990; Thorton, 1980).

Mikulecky (1987) differentiated these not so much within the context of setting, but in terms of reading strategies. Curricular reading can be classified primarily as "reading to learn" - occupational as "reading to do". A reading-to-learn task involves memorization of facts to be recalled at a latter date (Mikulecky, 1987). A reading-to-do task involves searching for and locating information for immediate use to solve a problem and/or perform a job task (CPD Group Ltd., 1989; Philippi, 1988).

Conclusions drawn from these studies indicate the following judgements.

1. Students primarily use textbooks and reference manuals to complete their course of study; workers use a wider range of materials (Chang, 1983; Mikulecky & Diehl, 1983).
2. "Workers read to accomplish tasks, solve problems, and make evaluation about the usefulness of material. . . . Students in secondary schools read primarily to obtain information needed to answer teacher questions." (Mikulecky, 1987, p. 4).
3. "Workers at the trainee level are called upon to read more than are the more experienced workers." (Taylor & Lewe, 1990, p. 14).

### Measuring Occupational Reading Demands

Researchers have employed a number of different methods to obtain descriptions and estimates of occupational reading tasks; analysis of work-related material for readability, difficulty, depth and scope, equivalent grade level, observation, and interviews. Stedman and Kaestle (1987) categorized these methods into four main areas: (a) approximation from years of schooling completed, (b) testing of reading skill from existing reading tests, (c) comparison of a grade reading level of a group and (d) the readability level of materials used in their situation and investigation of occupational reading requirements.

The appropriateness of these measurement methods can be questioned. A common difficulty is that job literacy tasks can be different from those which were tested (Chang, 1983; Mikulecky & Diehl, 1980; Stedman & Kaestle, 1987). The use of school attainment as a criterion presents certain problems because of differences between academic and vocational reading tasks. Administering tests poses problems, as the majority of tests are based on academic reading skills and not vocational reading skills. According to Edwards and Gould (1987), the inability of literacy and reading tests to predict which apprentices will be able to cope with the variety of reading demands in their specific trades is a major problem. Comparing reading levels of materials and grade level will highlight differences but will not specifically indicate the necessary required

literacy tasks of a specific occupation or group of occupations (Evetts & Flanagan, 1990).

Sage and Rose (1985) suggest using a subject matter analysis technique as a part of work behaviour analysis to avoid some of the problems presented above. This technique will identify the interaction between the employee and books, manuals and documents. When the frequency of performance, importance, and learning difficulty are established, the training emphasis which should be accorded to the subject matter can be determined (see Table 1). This technique also takes into account the maintenance and retention of task skills which occurs when a task is performed on a regular basis.

However, what is needed is a measurement which can identify the "job literacy gap", the discrepancy between the workers' literacy level and the skills required to carry out the job (Stedman & Kaestle, 1987). In order to develop an appropriate instrument to measure the literacy demands of the workplace, the specific reading demands of occupations need to be identified. As the various reading tasks, documents, strategies, skills and knowledge of an occupation will vary depending on the documents used on the job, these need to be identified as a first step.

## Summary

The cost of illiteracy to society, industry and business is great. Literacy can no longer simply be defined as the ability to read and write. In order to better prepare students for the reading demands and tasks of the work world, more information is needed. While literacy demands of workers have been the focus of a number of studies, more work needs to be done, because not enough is known about the specific reading demands of individual or clusters of occupations, particularly in the trades areas (Chang, 1983; Edwards & Gould, 1987; Evetts & Flanagan, 1990; Mikulecky & Diehl, 1983; Siedow, 1983; Stedman & Kaestle, 1987; Waugh, 1990).

## Review of Major Research Studies

A number of major studies have been conducted to examine the reading demands and tasks of occupations. The following section will briefly highlight previous work in the field of occupational literacy demands. Only the sections of the studies directly relevant to reading demands and blue collar/trade clusters of occupations will be included.

Generic skills for 27 occupations were examined by Arthur Smith (1974, 1975, 1979), under the auspices of Canadian Commission of Employment and Immigration. Reading demands for the construction cluster, included the ability to read forms, notes, letters, charts, tables, books and manuals and to comprehend facts from these materials.

Sticht and various colleagues, through the Human Resources Research Organization, have done extensive work on reading demands of military personnel, in order to develop reading programs that would improve training programs. Analysis conducted on the written aspect of reading demands indicated that when using occupational materials, there is a difference between reading to do and reading to learn. Data also indicated that "job related reading is used in conjunction with tasks which are of a repetitive nature, and are similar to other job tasks" (Sticht, 1978, p.14). Plus, Sticht (1982) reported that reading tasks could be divided into two categories: fact finding and following directions. In each group, the reading demand

could be further grouped into 6 types: text, figures and forms, tables, text with figure, text and tables, and tables and figures.

In 1980, Mikulecky and Diehl, conducted a study of the literacy demands, attitudes, and strategies of 107 occupations, representing a cross section of a working population. The literacy demands were assessed for the difficulty of materials, reading/writing scope, reading/writing depth, and the amount of time spent reading job materials per day. The results were analyzed to determine "(1) the job literacy profiles for various occupations, (2) significant differences between occupational groups and (3) the relationship between literacy demands, abilities, strategies and attitudes" (Mikulecky & Diehl, 1980, p.15). The results indicated that: (a) most people do some reading at work, (b) people spend close to 2 hours per day reading, and (c) the majority of reading task tend to be repetitive, integrated with other job tasks, and are reading-to-do tasks.

In 1982, Mikulecky investigated the congruences of the literacy demands, strategies and competencies between training for and employment in a number of occupational clusters. The literacy demands were measured by on job reading time, reading difficulty level, literacy scope and depth, relative importance of reading, and material type and format. The data analysis revealed: (a) there were differences between technical students and blue collar workers, (b) the average reading ability level was 11.5 for worker material and 11.3 for school material, and (c) reading for application was a goal

58% of the time for workers and only 7% for students. This led to the conclusion that differences between reading demands for school and for work exist.

Chang (1983) studied the curricular and occupational reading demands of the plumbing trade, comparing and contrasting the reading demands of apprentices and journeypersons. Reading within the educational component of the apprenticeship was also examined. The subjects in the study were students randomly drawn from fourth year apprenticeship classes and journeypersons currently employed in their trade. The research was composed of 4 steps: 1) to determine and describe the occupational and curricular reading demands, 2) to determine the difficulty of the reading materials, 3) to examine the nature and extent of functional instruction in reading curricular an/or occupational material, and 4) to identify any readily-apparent reading-related problems (Chang, 1983).

Upon completion of analysis of data, the author stated curricular and occupational reading demands for the plumbing trade do exist, and that there are similarities and differences between them. It was further identified that reading is an important occupational skill and as such has implications for the curriculum of apprenticeship training in the plumbing trade.

In 1984, Kirsch and Guthrie examined adult reading practices for work and leisure. The subjects were employees of one technology company, representing 14 job categories in 4 occupational clusters; managers/ professionals, technical/skilled, clerical, and semi-

skilled/service. The reading practices were divided into 3 dimensions: subject matter, material or format, and uses of reading material. They found differences do exist between work and leisure on all three dimensions. Differences between occupational clusters were also indicated by the data analysis.

Rush, Moe, and Storlie (1986) explored the reading, writing, listening, and speaking competencies of 10 occupations. The study examined occupational literacy competencies of workers at job sites and the corresponding courses at post-secondary occupational training institutions. After the literacy competencies of each occupation were identified, they were compared to requirements in corresponding vocational courses and then evaluated for their relative importance.

They found that reading occurred daily both on the job and in school, but the type of reading differed. Reading-to-do was the predominant type of used at work while reading-to-learn was the focus in training. It was ascertained that "Each occupation [had] its particular set of requirements which include literacy and language competencies. Each [had] a specialized vocabulary essential to understanding, learning and communication." (Kirsch & Guthrie, 1984, p.63). Several characteristics of occupational reading materials were determined: (a) graphics (figures, charts, pictures etc.) appear frequently, (b) workers frequently receive written or printed instructions, (c) interpretation of material which refers to some object or tool used in work situation, (d) specialized occupational

vocabulary, and (e) employment of expository styles of organizing information.

Edwards and Gould (1987) conducted a study to investigate the self-perceived, on-the-job reading needs of electrical mechanic apprentices, and the consequences of their making a reading error. A questionnaire, developed to measure the frequency of use of various on-the-job reading materials and the consequence of making a reading error, was administered to a random sample of 401 electrical mechanic apprentices in Victoria, Australia. The initial results of this study indicated that apprentices were involved with a wide range of reading tasks which, in general, were not lengthy. Skimming and scanning skills, employed to locate information quickly and accurately, appeared to be the main types of work-related reading tasks.

In 1989, Statistics Canada, on behalf of the National Literacy Secretariat, conducted a Survey of Literacy Skills Used in Daily Activities (LSUDA) with a sample of adult Canadians aged 16-69. This survey was designed to measure "an individual's ability to carry out tasks at a particular level of difficulty." (Jones, 1990, p. 4). Level 1 represented individuals who have difficulty dealing with printed materials. Individuals at Level 2 can find a key words or phrases in a simple text. An example of this level would be the ability to identify the items on a shopping list which were in an ad from a supermarket. Level 3 individuals "can use reading materials in a variety of situations provided the material is simple, clearly laid out

and the tasks involved are not too complex." (Statistics Canada, 1990, p. 2). The ability to find out if a particular kind of sandpaper could be used for the job at hand is an example of reading at this level. At Level 4, individuals can meet most reading demands, and would be capable of acquiring further knowledge using written material.

The preliminary data indicates that 16% (2.9 million) of Canada's adults can be classified as reading at Levels 1 and 2, and lack the reading skills to deal with everyday reading demands. Twenty-two percent (4.0 million) of Canadian adults were found to have Level 3 reading skills. The majority of the Canadian adult population (62%) were found to have reading abilities at Level 4.

There was a strong indication that the higher the education, the greater the number of people reading at a higher levels, but that completion of high school did not assure a high level of literacy. With some secondary schooling, 16% of Canadians are at Levels 1 and 2, 35% are at Level 3, and 48% are at Level 4. With completion of secondary school the numbers are 8% at Levels 1 and 2, 22% at Level 3 and 70% at Level 4. (Statistics Canada, 1990). These initial results lend support to the idea that there may be gaps between the literacy levels and the actual reading demands of the job.

Waugh (1990) conducted a feasibility study for the Carpenters and Allied Workers Union Local 27 in Toronto, Canada to provide information for the development of literacy programs. Questions focusing on suggestions for the components of literacy programs were part of the interviews held with a key community

organizations. Additionally, print material related to apprenticeship, the Union and training were reviewed.

Through this process, literacy skill barriers were identified. These include the inability to fill out application and other forms, to read promotional materials and the ability to understand safety signs written in English. Blueprint reading and level of education were mentioned as a potential barriers. The need for trade-specific language and to understand instructions, especially in training, were identified by the majority of the participants as problem areas (Waugh, 1990).

In their interim report, Taylor and Lewe (1990), presented three case studies of literacy task analysis approaches. "Literacy task analysis is the defining of the literacy elements required to do specific jobs" (Taylor & Lewe, 1990, p. 42). After each analysis, the results were examined in light of the Basic Skill Profile developed for the study.

The job components for the Automobile Repair Person were collected through an on-site observation interview. Using the Task Matrix Technique, the competencies were defined into job and task statements. These in turn were detailed and analyzed for sequence and relationship. The next step was to determine task criticality (frequency, importance and difficulty) of major tasks. The technique can be used to target essential training areas.

For the Grocery Store Receiver, a literacy task analysis was conducted using "the interview note technique and observation, with

additional elements from the job function and risk assessment techniques." (Taylor & Lewe, 1990, p.64). Some of the major complications revealed in this approach was the difficulty of evaluating prior knowledge. A master performer may take short cuts and not demonstrate all the literacy competencies needed for good job performance. However, if an entry level employee is observed, some reading tasks may be overemphasized or overlooked. The authors suggest steps be taken to ensure that a full range of competencies is covered.

To determine the literacy tasks of a Pre-cast Repair and Cleaning Person, the analyst met with the trades instructor to review the course content in terms of reading and writing requirements. On-site observations and discussions were then conducted. A Job Learning Analysis Scoring Grid was used to obtain a picture of the main tasks of the job, and the principal activities recorded for each main task were analyzed in more depth. This was followed by recording the results in the learning matrix, and subsequently interpreted in light of basic workplace skills. According to the authors, this method yielded some important information, but more work is needed "to test the true applicability of the method" (Taylor & Lewe, 1990, p. 92).

Of the above studies, five were conducted in the United States, and one in Australia, and their populations will differ from those of Canada. In addition, Sticht's work was conducted on a military population, which may or may not be generalizable to a civilian

population. Of the Canadian studies, Smith (1978) studied occupations in Saskatchewan, Chang (1983) examined the plumbing trade in Alberta, Taylor and Lewe (1990) analyzed the literacy tasks of occupations in Ontario, and Waugh's (1990) work was also conducted in Ontario. Therefore, they may not be generalizable to a Manitoban population.

The area of apprenticeship was another limitation of the studies. Only two studies were directly concerned with apprentices. In the other studies, occupations (blue collar, trade, or skilled labour) which may be apprenticed were not highlighted and as such it is difficult to extrapolate directly relevant data. Regarding the studies of Chang (1983) and Edwards and Gould (1987), systems of education and training of apprenticeship varies from country to country as well as province to province. In addition, each of the aforementioned studies were conducted with only one trade, and were not seeking more generic occupational reading demands. Therefore it was indicated that in order to obtain data relevant for Manitoba, a study needed to be conducted on an appropriate population.

## Review of Instruments

One common instrument for examining work-related literacy demands was a specific reading task checklist used in combination with interviews and observation. All researchers reviewed job-related literacy demands in the job setting, using actual workers and reading material as recommended by Jacob and Crandall (1979).

By observing and interviewing individuals in occupational settings, Smith (1974, 1975, 1979) developed a questionnaire to examine work-related reading demands. The checklist provided examples for each type of skill assessed. Through initial observations, interviews and analysis of reading materials of the different jobs, Sticht (1978) developed a checklist of reading demands. The resulting questionnaire included examples from material used on the job. Mikulecky and Diehl (1980), created their own instrument "The Diehl-Mikulecky Job Literacy Survey", in which the participants were requested to rate 48 statements, describing reading and writing in different situations, on a scale of 1 to 5. Mikulecky (1980) used a checklist of nine items based on Smith's generic skills to assess literacy scope and depth.

Chang (1983) used a checklist of 23 items in addition to observation, interviews and material analysis as a tool to develop a profile of reading tasks in the plumbing trade. Kirsch and Guthrie (1984) developed a Reading Activity Inventory through observation, self-report, and personal interviews which was then used by interviewers during in person interviews with workers in

a variety of occupations. Rush, Moe, and Storlie (1986) collected samples of reading and writing materials, and tape recordings from both job sites and training settings. Edwards and Gould (1987) used a group administered questionnaire containing 27 items of types and frequencies of reading tasks. They based the checklist on Sticht's work (1982) and information from trade teachers and other professionals involved in apprenticeship training.

Thus, one common instrument utilized was a specific reading task checklist in combination with other techniques. Edwards and Gould (1987) used only a checklist. For those studies which did not use a checklist, information was obtained by alternate methods. Mikulecky and Diehl (1980) developed their own rating system to measure job literacy requirements. Kirsch and Guthrie (1984) conducted in person interviews and case studies, using their own reading activity inventory.

### Summary

Employers are concerned about the literacy demands of workers currently in the workforce. A survey by the Conference Board of Canada found 40% of Canadian companies say employees face difficulties taking on new assignments or transfers due to a lack of basic skills (Des Lauriers, 1989). The problems found by individuals who are functionally illiterate in an employment setting can be

traced to the changes in technology, the higher reading demands of a job and to the educational system (de Grandpré, 1989, Statistics Canada, 1990).

It is becoming increasingly apparent that reading is an important vocational skill, necessary to carry out essential job duties and tasks (Chang, 1983; Chang 1987b; Pellegrino, 1988; Taylor & Lewe, 1990; Thorton, 1980; Waugh, 1990). Occupational literacy demands include specialized vocabulary, the presentation of information in a wide variety of formats, skills to locate information quickly and accurately, and the ability to apply the information to the job situation (Lee, 1981; Rush, 1986). Reading done on the job tends to be repetitive, with little or no memorization, and occupies approximately 2 hours per day. (Mikulecky & Diehl, 1980; Sticht, 1978). Reading in and for school tends to be for memorization of facts and uses primarily textbooks.

The difference between curricular and occupational reading is reflected in the problems with measurement activities, most of which are based on school attainment and equivalent grade level reading, but which are not based upon the actual demands made in the workplace (Stedman & Kaestle, 1987) In order to develop more accurate assessment tools, more information on the specific occupational reading demands needs to be gathered (Chang 1983; Evetts & Flanagan, 1990; Horne, 1979; Jacobs & Crandall, 1979; Mikulecky & Diehl, 1980; Rush, Moe & Storlie, 1986; Taylor & Lewe, 1990; Waugh, 1990).

Work has been done to examine specific reading demands, but it has limited application to a Manitoban context. Studies conducted outside of Canada, have different populations. Thus, there are problems with generalizability. This is also a problem for Canadian studies. They were conducted on populations outside of Manitoba. Another area of concern is generalizability to apprentices. Only two studies, Chang (1983) and Edwards and Gould (1987), examined reading demands of one specific apprentice group, but these are not generalizable to construction apprentices in Manitoba.

The literature suggests that specific reading tasks of occupational groups can be identified and that differences do exist between curricular and occupational reading demands. Reading demands are composed of the interaction between the reader, the processing operations and the documents. Different occupations will present different documents to the reader. The documents can be defined as on-the-job reading tasks and will carry varying importance for carrying out work-related duties. The literature also suggests that more information on the specific reading tasks of specific occupational groups must be obtained in order to provide better preparatory vocational training.

## CHAPTER III

### METHODOLOGY

#### Design of the Study

The design of the study followed a descriptive survey pattern to gather information from apprentices in seven designated construction trades in Manitoba. Their perceptions of frequency of use and importance of on-the-job reading tasks were collected with a questionnaire, using Likert-type scales. The survey method is recommended when trying to determine and report on the current situation under investigation (Gay, 1987). Therefore the descriptive method was used to answer questions concerning the perceptions of on-the-job reading tasks of construction apprentices in Manitoba.

#### Population

Seven construction trades representing the three major categories of construction apprentices, carpenter, mechanical, and electrical, were used in this study. These trades included cabinetmaker, carpenter, construction electrician, power electrician, plumber, steamfitter and sprinkler and fire protection installer. Only these trades had an institutional training component available in Manitoba and a minimum entrance requirement of at least Grade 9. As of June 1990, apprentices registered with the Manitoba Apprenticeship and

Training Branch of the Department of Labour provided a total population of 1361 for this study.

Other designated construction trades in Manitoba, bricklayer, building construction crane operator, drywall mechanic, glazier, interior systems mechanic, lather, painter & decorator, plasterer, sheeter, decker & cladder, and roofer were eliminated from the study. This restriction reduced the possibility of extraneous variables arising from differing training institutions (training conducted strictly on the work site or training in different provinces).

#### Sampling Procedure

The apprentices for this study were selected from the population, using a randomized blocking procedure. Three equal-sized groups of 64 for each category, carpentry, mechanical, and electrical, were formed. Each group reflected the proportional composition of the trades within the category. Furthermore, each level of apprenticeship was respected so as to have fair representation from each level of each designated trade (Gay, 1987).

For the category of carpentry, there were two trades. The carpenter trade had four levels of apprenticeship with a total of 534 registered apprentices. The cabinetmaker trade had four levels of apprenticeship, but had only 20 apprentices registered in the first two levels. To form the carpentry group, 15 apprentices from each

of the four levels of carpentry and two apprentices from levels one and two of cabinetmaking were selected. This provided a total group size of 64.

For the mechanical category, there were three trades: a) plumber, with five levels of training and 264 registered apprentices, b) steamfitter, with five levels of apprenticeship and 40 registered apprentices, and c) sprinkler and fire protection installer with four levels of training and 13 registered apprentices. To form the mechanical group, ten apprentices from each level of the plumber trade were selected for a sub-group of 50; two apprentices from each level of the steamfitter trade for a sub-group of ten were selected; and for the sprinkler and fire protection installer trade, one apprentice from each level for a sub-group of four were selected. This provided a group size of 64.

For the electrical group, there were two designated trades with four levels each, construction electrician with 404 apprentices and power electrician with 86 apprentices. To form the electrical group, 13 apprentices from each level of the construction electrician trade for a sub-group of 52 and three apprentices at each level of the power electrician for a sub-group of 12 were selected. This provided a group size of 64.

The sampling technique employed in this study identified a sample of 192 apprentices, representing 14.1% of the population.

### Development of the Instrument

In past studies, a reading task checklist has been a common instrument used to examine occupational literacy demands. Each succeeding study reviewed past work and modified it for their particular needs; Smith (1974), Sticht (1975), Mikulecky and Diehl (1980), Chang (1983), Kirsch and Guthrie (1984a), Rush, Moe, and Storlie (1986), and Edwards and Gould (1987). From this work, a proposed list of 29 reading tasks (Appendix A) was developed from reading tasks identified in literature as being related to work situations in trade-related areas (Chang, 1983; Edwards & Gould, 1987; Mikulecky, 1987; Rush Moe & Storlie, 1986; Smith, 1979; Sticht, 1978; Thorton, 1980).

The next step was to verify the suitability of this list. It was taken to three employers identified by Mr. Gervin Greasly of the Winnipeg Construction Association. Each employer represented one of the major categories of construction apprentices: carpentry, electrical, and mechanical. Each employer was contacted and an appointment for an in-person interview was set up. Sample reading material was also reviewed.

The purpose of the interview was to review and clarify the reading tasks for use in a Manitoban context and to provide an idea of the frequency of use for each task whether it was daily, weekly, 2-3 times a month, monthly, never or not applicable. Requesting employers to identify the frequency of use for the reading tasks, allowed the investigator to identify the most commonly occurring of

on-the-job reading tasks for these three categories. This would permit the survey to be tailored for use within the context of the study.

The proposed list was first taken to Mr. Jeff Andruchuk of Safeway Electric representing the electrical category. In reviewing the list, the following information was obtained. The term "job sheet" was not used. Installation and manufacturer's instruction should be combined, as should operating, technical and reference manuals. The tasks of reading tables, charts and graphs fall into the same category. The term "form" needed to be clarified (e.g., government or insurance forms). Suggested additions were log or time sheets, invoices and schematics. The reading material reviewed by the investigator were work orders and memos to staff.

The next person to review the proposed list was Mr. Warriner Beckman of Comstock Canada, who represented the mechanical group. In reviewing the list, the following information was obtained. The term "invoices" should be grouped with "bills". The term "plan" was ambiguous as it could apply to blueprints as well as schedules and organizing plans. Charts, tables and graphs should be grouped together. The term "forms" could refer to shipping and receiving forms. Safety warning/rules/notices should be clarified to refer to signs on site. Also a distinction between drawings, sketches and blueprints needed to be drawn. The term "job sheets" was used in conjunction with time or log sheets. It was also suggested that reference and operating manuals should be grouped, as should the

tasks related to instructions. The reading tasks of schedules and permits were also added. Company brochures were the reading materials reviewed here.

The third person interviewed was Mr. Paul Schmalz of PCL Constructors Western Inc. In reviewing the proposed list, the following changes were recommended: the inclusion of invoices with bills, the clarification of types of brochures and catalogues, the grouping of charts, tables and graphs together, the clarification of types of forms (for example shipping and receiving), and clarification of the term "plans" and "safety" as signs on site. Additionally, Mr. Schmalz made a copy of the list with his clarification of terms and sent it to three field supervisors who were asked to review the proposed list and indicate whether each task was used and if so, the frequency of use. These were then collected and delivered to the investigator. As a final point, the reading material reviewed here illustrated the difference between blueprints and plans.

The information gathered was tabulated and analyzed (Appendix B). For all categories of apprentices, the following reading tasks were rated most highly for use and frequency :

- directions,
- drawings,
- diagrams,
- construction regulations,
- blueprints,
- building codes,

- safety warnings/signs,
- installation instructions,
- planning./schedules,
- work orders,
- estimates,
- checklists,
- forms (shipping/receiving, government),
- tool/equipment instructions,
- operating manuals,
- handwritten memos,
- charts/tables/graphs,
- manufacturer's instructions,
- bills or invoices,
- brochures,
- reference manuals,
- technical manuals,
- handwritten instructions,
- catalogues,
- parts numbers, and
- trade magazines.

From this information, it was decided to eliminate the tasks of job sheets and replace it with the task of log sheets, schedules and/or time sheets. The tasks of handwritten memos and handwritten instructions were combined, as were the technical, reference and operating manuals, and the tasks of manufacturer's and installation

instructions. The terms of catalogues and brochures were also combined. It was decided to leave the task of blueprint reading to stand alone.

This provided a list of 20 reading tasks to be included in the survey:

- directions,
- safety warnings - on site signs,
- drawing or schematics,
- manufacturer's brochures or catalogues,
- tables-charts-graphs (building code books),
- technical-reference-operating manuals,
- construction regulations,
- handwritten memos or instructions,
- forms such as shipping and receiving or government,
- estimates,
- blueprints,
- tool or equipment instructions,
- work orders,
- diagrams,
- log sheets-schedules-time sheets (plans),
- trade magazines,
- bills or invoices,
- checklists,
- installations or manufacturer's instructions, and
- parts numbers.

## The Instrument

Upon completion of the interviews, and the establishment of 20 on-the-job reading tasks for a Manitoban population, the survey instrument for this study consisting of four sections was finalized.

Part A, background information, was designed to secure demographic data of the apprentices: trade, apprenticeship level, age range, gender, first language and educational background.

Part B of the instrument was designed to assess the frequency of use for each of the 20 specific work-related reading tasks as determined through the process described above. This section used a Likert-type rating scale from 1 to 5 to rank each reading task for frequency of use. The frequency categories are "Daily"(1), "2-3 Times a Week"(2), "Once a Week"(3), "Once a Month"(4), and "Never"(5) have been adapted from similar surveys conducted by Chang (1983) and Edwards and Gould (1987). The rating scale was adapted from "The Diehl-Mikulecky Job Literacy Survey" (Mikulecky & Diehl, 1980).

Part C of the instrument was designed to evaluate the importance of each reading task. In this section, the participant was asked to read a statement concerning the importance of each of the 20 reading tasks and indicate the degree to which she/he agreed with the statement. A Likert-type scale from 1 to 5 for rating the response from "Strongly Agree"(1) to "Strongly Disagree"(5) was used. The number of positive and negative statements were balanced in an attempt to avoid response set.

Part D of the instrument permitted additional information to be added by the respondent.

The face validity of the instrument was evaluated by circulating a copy of the survey to three apprenticeship counsellors in the Winnipeg office of the Apprenticeship and Training Branch. They evaluated the scale and questionnaire for additions or deletions to the proposed list of reading tasks and for the appropriateness of the frequency categories and importance statements. After their review, the instrument was revised as follows: the term "construction regulations" was replaced with "safety rules", the term "diagram" was clarified by adding "such as for installation of a part", and the phrase "such as materials checklist" was added to the term "checklist".

### Pilot Testing

The revised instrument was pilot tested with a sample of fourth level carpenters and power and construction electricians who were not selected as part of the study's sample. This group was chosen for pilot testing, as they were apprentices nearing completion of their program, and should possess characteristics similar to the population. A copy of the survey, with a letter of instruction (Appendix C), was sent to 30 apprentices on August 16, 1990. Thirteen responses were returned.

No additions, deletions, or other revisions were indicated. The final form of the instrument is presented in Appendix D.

### Data Collection

Data was collected through a survey instrument sent to 190 construction apprentices, as identified by the sampling procedure, in seven designated trades in the three categories. The questionnaire and a covering letter (Appendix E) was sent on September 14, 1990 to all participants in the sample to solicit their participation in this study. A stamped and self-addressed return envelope was included. A two week return was requested. On October 11, 1990, a follow-up packet containing material similar to the the initial mailing was sent out to non-respondents (Appendix F). Apprenticeship and Training Branch letterhead was used to stimulate responses.

To assess reasons for non participation, 21 non-respondents were randomly selected and contacted by telephone, by an employee in the Apprenticeship and Training Branch. This was done to see if there are any significant differences between respondents and non-respondents which could bias this study. The main reasons for non-participation were either they had no time or they did not receive the survey.

## Data Analysis

Descriptive statistics were used to analyze the data. The data were coded and the FASTAT (Fast Statistics for the Mac, 1989) program was used. Because there was no existing database for on-the-job reading tasks of apprentices in Manitoba, the data (calculated percentages and frequencies) were examined for each on-the-job reading task.

The following criteria were set for the analysis.

- 1) An on-the-job reading task was deemed frequent if the calculated mean was  $\leq 3$ . This indicated that the on-the-job reading task was used at least on a weekly basis. To determine this, each response was converted to a 1 to 5 scale with 1 being most frequent (daily) and 5 being least frequent (never). The frequencies, percentages and means were then calculated for each individual on-the-job reading task.
  
- 2) An on-the-job reading task was deemed important if the calculated mean for the reading task was  $\leq 2$ . This indicated that the task was either very important or important. To establish the importance of an on-the-job reading task, the statements were converted to reflect all positive readings. This provided a scale indicating 1 as being most important to 5 as being least important. The frequencies, percentages and means were then calculated for each individual on-the-job reading task.

3) The training emphasis for an on-the-job reading task was determined by examining the means for frequency and the importance for each on-the-job reading task. If the importance was high ( $\leq 2$ ), and the frequency of performance was on a "daily" or "2-3 times a week" basis ( $< 3$ ), then the training emphasis was "train". If the importance was high and the frequency of performance was on a "once a week", "once a month" or "never" basis ( $>3$ ), then the training emphasis was "over-train". If the importance was low ( $>2$ ), and the frequency of performance was "daily" ( $\leq 1$ ), then the training emphasis was "no training". For reading tasks with low importance and frequency of performance of "2-3 times a week", "once a week", or "once a month" ( $\leq 4$ ) the training emphasis was "train". A reading task with a low importance and frequency of "never" ( $>4$ ) would have a training emphasis of "no training". Table 1 outlines these categories.

The rationale behind these categories is based on the assumption that the frequency of performance will influence the on-going development and maintenance of the skills necessary for task completion which in turn influence the emphasis to be placed on the task during preparatory training. These emphasis may vary depending on the increasing experience and responsibilities of workers.

For a high importance task which is not performed frequently enough to benefit from skill development and maintenance through practice, over-training will be necessary. With high importance and

performance of frequency, the skill needed for task completion will be maintained through practice on the worksite. For a reading task of low importance, the training emphasis will vary more. If the task is used daily, it is assumed that the skill will be maintained through practice on the work site and no training will be needed. If the task is not used and is not important, then no training is needed. For all other categories of frequency of performance, the emphasis will be to train. Here, it will be necessary to have some skills in these tasks, so the emphasis will be to train.

- 4) The t-test for independent samples, with a probability level set at .05 was used to test for difference between the perceptions of the groups of entry and advanced level apprentices for selected on-the-job reading tasks. The reading tasks selected for testing were those tasks with the maximum difference between the means, of advanced and entry level apprentices, for either frequency or importance. If no significant difference was found at the .05 level, then it would be assumed that no significant differences existed for items with smaller differences between the means. If significant differences were found then, t-tests would be run for items with the next largest difference between the means.

TABLE 1

Determining Training Emphasis for On-the-Job Reading Tasks

| On-the-Job<br>Reading Task | Importance          | Frequency of<br>Performance     | Training<br>Emphasis |
|----------------------------|---------------------|---------------------------------|----------------------|
|                            | <u>High</u>         | Daily(1)<br>2-3 Times a Week(2) | Train<br>Train       |
|                            | Very Important (1)  | Once a Week(3)                  | Over-Train           |
|                            | Important(2)        | Once a Month (4)                | Over-Train           |
|                            |                     | Never(5)                        | Over-Train           |
|                            | <u>Low</u>          | Daily(1)                        | No Training          |
|                            | Undecided (3)       | 2-3 Times a Week(2)             | Train                |
|                            | Unimportant(4)      | Once a Week(3)                  | Train                |
|                            | Very Unimportant(5) | Once a Month(4)                 | Train                |
|                            |                     | Never (5)                       | No Training          |

Source: Adapted from J.E. Sage & V.A. Rose (1985) Analyzing work behaviors.

in H. Birnbraner (ed.). The ASTD handbook for technical and skills training, Volume 1, (p. 37).

## CHAPTER IV

### RESULTS AND DISCUSSION

#### Introduction

The primary purpose of this chapter will be to analyze data regarding the on-the-job reading tasks of apprentices in seven designated construction trades in Manitoba. The findings reported in this chapter were based on data obtained from 88 apprentices who responded to survey questionnaires. The findings of the study focus on the frequency of use, perceived importance, and training emphasis of on-the-job reading tasks of entry and advanced level apprentices, and the difference in perceptions regarding the on-the-job reading tasks. The results of the various statistical analyses conducted for this study are organized and discussed in the following manner:

- a) the return rate
- b) background information on the demographic characteristics of the respondents;
- c) the overall order for frequency of use of the on-the-job reading tasks and the order for advanced and entry level apprentices;
- d) the overall order for the perceived importance of the on-the-job reading tasks, and the order for advanced and entry level apprentices;

- e) the determination of the training emphasis for on-the-job reading task from importance and frequency;
- f) the results of t-tests; and
- g) a summary of responses given for the open-ended question of Part D of the survey.

### Return Rate

In September and October 1990, the survey was mailed to 190 apprentices. Because there were no registered apprentices in the third level of steamfitter, the sample size was reduced from 192 to 190. Twenty-two surveys were returned as addressee unknown. Of the 89 surveys completed and returned, one came in after the cutoff date and was not included in the data analysis. This gave a return rate of 53%, of the accessible sample, which according to the Apprenticeship and Training Branch was a high rate of return, as typically in the past, the return rate of other surveys had been approximately 30%.

A sample of non-respondents was contacted to assess reasons for non-participation. The reasons given for non-participation were: not received (7), no time (7), misplaced (2), completed but not mailed (2), forgot (1), not interested (1), and did not agree with purpose (1).

### Background Information on the Demographic Characteristics of Respondents

The demographic data for apprentices were obtained from Part A of the survey questionnaire (Appendix D).

The apprentices who chose to participate in this study, appear to reflect the workforce composition for apprentices. The core of workers in the labour force is the group of males aged 25-44 (Success in the Works, 1989a). All but one of the respondents fell into this category. The sole female respondent, represents the 1.4% of apprentices in Manitoba who are female (CLMPC, 1990). The 27 percent of the respondents who indicated their age range as being "15-24" reflects the 22 percent for Canada as a whole (Success in the Works, 1989a). The educational background of the sample also reflects the statistics for Manitoba. It is estimated that 45% of the work force has not completed secondary schooling and 10% of the population has some post secondary education (Mauro, 1991). In this study, 32% of the respondents had not completed secondary education, and approximately 10% has some post secondary education.

### Trade and Apprenticeship Level

Table 2 shows the respondents' trade and apprenticeship level. In grouping according to entry and advanced levels, there are 39 (44%) apprentices considered to be in the entry level (level 1 or 2), and 46 (52%) apprentices considered to be in the advanced level (level 3, 4 or 5).

Table 3 shows the number of apprentices by trade cluster and apprenticeship levels.

TABLE 2

Frequency of Apprentices in Each Trade and at Each Level

| Trade                                    | Apprenticeship Level |              |              |              |            |            | Total         |
|--|----------------------|--------------|--------------|--------------|------------|------------|---------------|
|  | 1                    | 2            | 3            | 4            | 5          | Not Given  |               |
| Frequency<br>(Percentage)                | f<br>(%)             | f<br>(%)     | f<br>(%)     | f<br>(%)     | f<br>(%)   | f<br>(%)   | f<br>(%)      |
| Cabinetmaker                             | 2<br>(2.3)           | 1<br>(1.1)   | 0<br>(0.0)   | 0<br>(0.0)   | na         | 0<br>(0.0) | 3<br>(3.4)    |
| Carpenter                                | 10<br>(11.4)         | 7<br>(8.0)   | 8<br>(9.1)   | 7<br>(8.0)   | na         | 1<br>(1.1) | 33<br>(37.5)  |
| Construction Electrician                 | 3<br>(3.4)           | 3<br>(3.4)   | 11<br>(12.5) | 3<br>(3.4)   | na         | 0<br>(0.0) | 20<br>(22.7)  |
| Power Electrician                        | 1<br>(1.1)           | 1<br>(1.1)   | 2<br>(2.8)   | 3<br>(3.4)   | na         | 1<br>(1.1) | 8<br>(9.1)    |
| Plumber                                  | 5<br>(5.7)           | 4<br>(4.6)   | 3<br>(3.4)   | 2<br>(2.8)   | 6<br>(6.8) | 1<br>(1.1) | 21<br>(23.7)  |
| Steamfitter                              | 2<br>(2.3)           | 0<br>(0.0)   | 0<br>(0.0)   | 0<br>(0.0)   | 0<br>(0.0) | 0<br>(0.0) | 2<br>(2.3)    |
| Sprinkler & Fire<br>Protection Installer | 0<br>(0.0)           | 0<br>(0.0)   | 1<br>(1.1)   | 0<br>(0.0)   | na         | 0<br>(0.0) | 1<br>(1.1)    |
| Total                                    | 23<br>(26.1)         | 16<br>(18.2) | 25<br>(28.4) | 15<br>(17.1) | 6<br>(6.8) | 3<br>(3.4) | 88<br>(100.0) |

Note: na indicates that the level does not exist for the trade

TABLE 3

## Frequency of Apprentices by Trade Cluster and Level

| Trade Cluster             | Entry Level  |              |              | Advanced Level |              |            | Not Given    | Total         |
|---------------------------|--------------|--------------|--------------|----------------|--------------|------------|--------------|---------------|
|                           | 1            | 2            | Total        | 3              | 4            | 5          |              |               |
| Frequency<br>(Percentage) | f<br>(%)     | f<br>(%)     | f<br>(%)     | f<br>(%)       | f<br>(%)     | f<br>(%)   | f<br>(%)     | f<br>(%)      |
| Carpentry                 | 12<br>(13.6) | 8<br>(9.1)   | 20<br>(22.7) | 8<br>(9.1)     | 7<br>(8.0)   | na         | 15<br>(17.0) | 1<br>(1.1)    |
| Electrical                | 4<br>(4.5)   | 4<br>(4.5)   | 8<br>(9.1)   | 13<br>(14.8)   | 6<br>(6.8)   | na         | 19<br>(21.6) | 1<br>(1.1)    |
| Mechanical                | 7<br>(8.0)   | 4<br>(4.5)   | 11<br>(12.5) | 4<br>(4.5)     | 2<br>(2.3)   | 6<br>(6.8) | 12<br>(13.6) | 1<br>(1.1)    |
| Total                     | 23<br>(26.1) | 16<br>(18.2) | 39<br>(44.3) | 25<br>(28.4)   | 15<br>(17.0) | 6<br>(6.8) | 46<br>(52.3) | 3<br>(3.4)    |
|                           |              |              |              |                |              |            |              | 88<br>(100.0) |

note: the totals may not match due to rounding

### Age Range

Forty -five (51%) of the respondents were in the age range of 25-34, 24 (27%) were in 16-24 age range and 17 (19%) were in the 34-42 age range.

### Educational Background

Two aspects of the educational background were considered, the highest grade level attained and other educational experiences. For the first, the respondents' responses broke down as follows: Grade 12 - 50 (56% of the respondents); Grade 11 - 10 (11%); Grade 10 - 11 (12%); Grade 9 - 7 (8%); and Grade 8 - 1 (1%). There were 42 responses given for the second aspect. The replies included pre-employment courses (2); community college (25); university/post secondary courses (9); upgrading (3); hydro courses (2); evening-technical (1).

### First Language

The replies to this question showed that first languages were: English for 66 (75% of the respondents), a Native language for 7 (8%), French for 3 (3%), Spanish for 2 (2%), Vietnamese for 1 (1%), German for 1 (1%) and no response was given by 9 (9%).

### Ratio of Male to Female

There were 85 male respondents, 1 female respondent and no response given by two.

## Frequency Use of On-the-Job Reading Tasks

### Question #1

With what frequency do entry and advanced level apprentices perform identified on -the-job reading tasks during their on-the-job component of their apprenticeship training ?

### All Apprentices

Part B of the apprentices' questionnaire investigated the extent of frequency to which reading occurs during the on-the-job training component of apprenticeship training. Apprentices were asked to rate the frequency of occurrence of each on-the-job reading task as "Daily", "2-3 Times a Week", "Weekly", "Monthly" or "Never".

The reported frequency of use for each of the 20 identified on-the-job reading task is presented in Table 4. If the mean for the reading task was  $\leq 3$ , indicating that it was used on a daily, 2-3 times a week or on a weekly basis, then the task was deemed to be frequent. The most frequent on-the-job reading tasks found for apprentices as a group were:

- a) safety warnings (2.32),
- b) drawings/schematics (2.35),
- c) directions (2.61),
- d) blueprints (2.61),
- e) handwritten memos/instructions (2.67), and
- f) checklists (2.75).

TABLE 4

Frequency of Use of On-the-Job Reading Tasks for Apprentices as a Group

| Task <sup>1</sup>                            | Frequency |              |                |                 |        | Mean      |
|--|-----------|--------------|----------------|-----------------|--------|-----------|
|  | Daily     | 2-3/<br>Week | Once a<br>Week | Once a<br>Month | Never  |           |
| Frequency(Percentage)                        | f(%)      | f(%)         | f(%)           | f(%)            | f(%)   | $\bar{X}$ |
| Safety Warnings                              | 32(36)    | 20(23)       | 19(22)         | 10(11)          | 7(8)   | 2.32      |
| Drawings/Schematics                          | 31(35)    | 24(27)       | 9(10)          | 17(19)          | 7(7)   | 2.35      |
| Blueprints                                   | 29(33)    | 15(17)       | 14(16)         | 21(24)          | 9(10)  | 2.61      |
| Directions                                   | 28(32)    | 20(23)       | 15(17)         | 6(7)            | 18(20) | 2.61      |
| Handwritten Memos                            | 26(30)    | 16(18)       | 19(22)         | 15(17)          | 12(14) | 2.67      |
| Checklists                                   | 21(24)    | 23(26)       | 13(15)         | 19(22)          | 12(14) | 2.75      |
| Diagrams                                     | 9(10)     | 22(25)       | 22(25)         | 26(30)          | 9(10)  | 3.05      |
| Plans  | 25(29)    | 6(7)         | 22(25)         | 10(11)          | 25(28) | 3.05      |
| Bills/Invoices                               | 12(14)    | 15(17)       | 16(18)         | 21(24)          | 23(26) | 3.32      |
| Installation/Manufacturer's Instructions     | 5(6)      | 17(19)       | 24(27)         | 29(33)          | 13(14) | 3.32      |
| Work Orders                                  | 18(20)    | 8(9)         | 15(17)         | 14(16)          | 33(38) | 3.41      |
| Manufacturer's -<br>Brochures/Catalogues     | 8(9)      | 8(9)         | 27(31)         | 28(32)          | 17(19) | 3.43      |
| Forms  | 9(10)     | 12(14)       | 20(23)         | 24(27)          | 23(26) | 3.46      |
| Table/Charts/Graphs<br>(Building Code Books) | 7(8)      | 14(16)       | 22(25)         | 22(25)          | 23(26) | 3.46      |
| Parts Numbers                                | 14(16)    | 8(9)         | 10(11)         | 22(25)          | 33(38) | 3.60      |
| Technical/Reference<br>Manuals               | 5(6)      | 14(16)       | 18(20)         | 24(27)          | 27(31) | 3.61      |
| Safety Rules<br>(Construction Regulations)   | 4(5)      | 8(9)         | 21(24)         | 35(40)          | 20(23) | 3.67      |
| Tool/Equipment<br>Instructions               | 5(6)      | 11(13)       | 13(15)         | 31(35)          | 28(32) | 3.75      |
| Trade Magazines                              | 0(0)      | 4(5)         | 13(15)         | 39(44)          | 32(36) | 4.13      |
| Estimates                                    | 6(7)      | 9(10)        | 5(6)           | 13(15)          | 55(63) | 4.16      |

<sup>1</sup> Due to rounding and because of lack of responses on certain tasks, 100% may not be achieved.

### Entry Level Apprentices

The results of the frequency of use for entry level apprentices are presented in Table 5. The most frequent on-the-job reading tasks found for entry level apprentices were:

- a) safety warnings (2.13),
- b) drawings/schematics (2.28),
- c) blueprints (2.49),
- d) directions (2.68),
- e) checklists (2.80), and
- f) handwritten memos/instructions (2.85).

### Advanced Level Apprentices

The results of the frequency of use for advanced level apprentices are presented in Table 6. The most frequent on-the-job reading tasks found for advanced level apprentices were:

- a) drawings/schematics (2.36),
- b) safety warnings (2.46),
- c) handwritten memos/instructions (2.48),
- d) directions (2.63),
- e) blueprints (2.67),
- f) checklists (2.78),
- g) diagrams (2.98), and
- h) plans (3.00).

TABLE 5

Frequency of On-the-Job Reading Tasks for Entry Level Apprentices

| Task <sup>1</sup>                            | Frequency |              |                |                 |        | Mean      |
|--|-----------|--------------|----------------|-----------------|--------|-----------|
|  | Daily     | 2-3/<br>Week | Once a<br>Week | Once a<br>Month | Never  |           |
| Frequency(Percentage)                        | f(%)      | f(%)         | f(%)           | f(%)            | f(%)   | $\bar{X}$ |
| Safety Warnings                              | 18(21)    | 7 (8)        | 6( 7)          | 7 (8)           | 1(1)   | 2.13      |
| Drawings/Schematics                          | 16(19)    | 8(10)        | 5 (6)          | 8(10)           | 2(2)   | 2.28      |
| Blueprints                                   | 15(18)    | 6 (7)        | 5 (6)          | 10(12)          | 3(4)   | 2.49      |
| Directions                                   | 11(13)    | 8(10)        | 10(12)         | 0 (0)           | 9(11)  | 2.68      |
| Handwritten Memos                            | 10(12)    | 6 (7)        | 10(12)         | 6 (7)           | 7 (8)  | 2.85      |
| Checklists                                   | 9(11)     | 9(11)        | 7 (8)          | 9(11)           | 5 (6)  | 2.80      |
| Diagrams                                     | 4 (5)     | 10(12)       | 8 (9)          | 11(13)          | 6 (7)  | 3.13      |
| Plans  | 11(13)    | 3 (4)        | 8 (9)          | 4(4)            | 13(15) | 3.13      |
| Bills/Invoices                               | 5 (6)     | 7 (8)        | 6 (7)          | 12(14)          | 8(10)  | 3.29      |
| Installation/Manufacturer's Instructions     | 3 (4)     | 7 (8)        | 9(11)          | 11(13)          | 9(11)  | 3.41      |
| Work Orders                                  | 6 (7)     | 3 (4)        | 4 (5)          | 8 (9)           | 18(21) | 3.74      |
| Manufacturer's -<br>Brochures/Catalogues     | 2 (2)     | 6 (7)        | 12(14)         | 8 (9)           | 11(13) | 3.51      |
| Forms  | 4 (5)     | 2 (2)        | 10(12)         | 13(15)          | 10(12) | 3.59      |
| Table/Charts/Graphs<br>(Building Code Books) | 2 (2)     | 8 (9)        | 7 (8)          | 9(11)           | 13(15) | 3.59      |
| Parts Numbers                                | 10(12)    | 3 (4)        | 2(2)           | 7 (8)           | 17(20) | 3.46      |
| Technical/Reference<br>Manuals               | 1 (1)     | 6 (7)        | 11(13)         | 6 (7)           | 15(18) | 3.72      |
| Safety Rules<br>(Construction Regulations)   | 3 (4)     | 3 (4)        | 10(12)         | 15(18)          | 8 (9)  | 3.56      |
| Tool/Equipment<br>Instructions               | 3 (4)     | 4 (5)        | 4(5)           | 16(19)          | 12(14) | 3.77      |
| Trade Magazines                              | 0 (0)     | 3 (4)        | 6 (7)          | 12(14)          | 18(21) | 4.15      |
| Estimates                                    | 3 (3)     | 3 (3)        | 1 (1)          | 8 (9)           | 24(28) | 4.21      |

<sup>1</sup> Due to rounding and because of lack of responses on certain tasks, 100% may not be achieved.

TABLE 6

Frequency of On-the-Job Reading Tasks for Advanced Level Apprentices

| Task <sup>1</sup>                            | Frequency |               |                |                 |        | Mean      |
|--|-----------|---------------|----------------|-----------------|--------|-----------|
|  | Daily     | 2-3 /<br>Week | Once a<br>Week | Once a<br>Month | Never  |           |
| Frequency(Percentage)                        | f(%)      | f(%)          | f(%)           | f(%)            | f(%)   | $\bar{X}$ |
| Safety Warnings                              | 13(15)    | 12(14)        | 13(15)         | 3(4)            | 5(4)   | 2.46      |
| Drawings/Schematics                          | 15(16)    | 14(17)        | 4(5)           | 9(10)           | 3(4)   | 2.36      |
| Blueprints                                   | 14(16)    | 8(9)          | 8(9)           | 11(13)          | 5(6)   | 2.67      |
| Directions                                   | 15(18)    | 11(13)        | 5(6)           | 6(7)            | 9(11)  | 2.63      |
| Handwritten Memos                            | 16(18)    | 9(11)         | 8(9)           | 9(11)           | 4(5)   | 2.48      |
| Checklists                                   | 11(13)    | 12(14)        | 6(7)           | 10(12)          | 7(8)   | 2.78      |
| Diagrams                                     | 5(6)      | 11(13)        | 13(15)         | 14(16)          | 3(3)   | 2.98      |
| Plans  | 13(15)    | 2(2)          | 14(16)         | 6(7)            | 11(13) | 3.00      |
| Bills/Invoices                               | 7(8)      | 7(8)          | 8(10)          | 9(11)           | 15(18) | 3.39      |
| Installation/Manufacturer's Instructions     | 2(2)      | 8(9)          | 15(18)         | 17(20)          | 4(5)   | 3.28      |
| Work Orders                                  | 11(13)    | 4(5)          | 11(13)         | 6(7)            | 14(16) | 3.17      |
| Manufacturer's -<br>Brochures/Catalogues     | 6(7)      | 1(1)          | 14(16)         | 19(22)          | 6(7)   | 3.39      |
| Forms  | 5(6)      | 8(9)          | 10(12)         | 10(12)          | 13(15) | 3.39      |
| Table/Charts/Graphs<br>(Building Code Books) | 4(5)      | 5(6)          | 14(16)         | 13(15)          | 10(12) | 3.44      |
| Parts Numbers                                | 3(4)      | 5(6)          | 8(9)           | 15(18)          | 15(18) | 3.74      |
| Technical/Reference<br>Manuals               | 4(5)      | 6(7)          | 7(8)           | 17(20)          | 12(14) | 3.59      |
| Safety Rules<br>(Construction Regulations)   | 1(1)      | 4(5)          | 11(13)         | 19(22)          | 11(13) | 3.76      |
| Tool/Equipment<br>Instructions               | 1(1)      | 6(7)          | 9(11)          | 15(18)          | 15(18) | 3.80      |
| Trade Magazines                              | 0(0)      | 0(0)          | 7(8)           | 25(29)          | 14(16) | 4.15      |
| Estimates                                    | 3(4)      | 5(6)          | 4(5)           | 5(6)            | 29(34) | 4.13      |

<sup>1</sup> Due to rounding and because of lack of responses on certain tasks, 100% may not be achieved.

### Comparison of Groups

Table 7 presents a comparison of means for the frequency of use for the composite group and the entry and advanced level groups of apprentices. Any discrepancies in the figures was due to the inclusion of three apprentices in the composite group and not in either of the level groups.

Table 8 presents the order of priority of use for the different groups. In examining this table, it can be noted that while the frequency of most of the on-the-job reading tasks were similar, with order differences of three or less, there are three tasks which differ for the entry and advanced level apprentices. These three were:

- work orders (entry = 17, advanced = 9),
- parts numbers (entry = 11, advanced = 16), and
- safety rules (entry = 13, advanced = 17).

The difference for the reading task of "work orders" may possibly be a reflection of the added duties and responsibilities of advanced level apprentices. For the other tasks, "parts numbers" and "safety rules", the difference may be attributed to advanced level apprentices' exposure to these tasks and the lesser need to refer to them to obtain required information.

TABLE 7

## Frequency Means of On-the-Job Reading Tasks

| Task                                      | Composite<br>$\bar{X}$ | Entry<br>$\bar{X}$ | Advanced<br>$\bar{X}$ |
|---|------------------------|--------------------|-----------------------|
| Safety Warnings                           | 2.32                   | 2.13               | 2.46                  |
| Drawings/Schematics                       | 2.35                   | 2.28               | 2.36                  |
| Blueprints                                | 2.61                   | 2.49               | 2.67                  |
| Directions                                | 2.61                   | 2.68               | 2.63                  |
| Handwritten Memos                         | 2.67                   | 2.85               | 2.48                  |
| Checklists                                | 2.75                   | 2.80               | 2.78                  |
| Diagrams                                  | 3.05                   | 3.13               | 2.98                  |
| Plans                                     | 3.05                   | 3.13               | 3.00                  |
| Bills/Invoices                            | 3.32                   | 3.29               | 3.39                  |
| Installation/Manufacturer's Instructions  | 3.32                   | 3.41               | 3.28                  |
| Work Orders                               | 3.41                   | 3.74               | 3.17                  |
| Manufacturer's - Brochures/Catalogues     | 3.43                   | 3.51               | 3.39                  |
| Forms                                     | 3.46                   | 3.59               | 3.39                  |
| Table/Charts/Graphs (Building Code Books) | 3.46                   | 3.59               | 3.44                  |
| Parts Numbers                             | 3.60                   | 3.46               | 3.74                  |
| Technical/Reference Manuals               | 3.61                   | 3.72               | 3.59                  |
| Safety Rules (Construction Regulations)   | 3.67                   | 3.56               | 3.76                  |
| Tool/Equipment Instructions               | 3.75                   | 3.77               | 3.80                  |
| Trade Magazines                           | 4.13                   | 4.15               | 4.15                  |
| Estimates                                 | 4.16                   | 4.21               | 4.13                  |

TABLE 8

Priority of Order Based on the Frequency of On-the-Job Reading Tasks

| Task   | Frequency Priority Order    |                         |                            |
|--|-----------------------------|-------------------------|----------------------------|
|  | Composite<br>Priority Order | Entry<br>Priority Order | Advanced<br>Priority Order |
| Safety Warnings                              | 1                           | 1                       | 2                          |
| Drawings/Schematics                          | 2                           | 2                       | 1                          |
| Blueprints                                   | 3                           | 3                       | 5                          |
| Directions                                   | 4                           | 4                       | 4                          |
| Handwritten Memos                            | 5                           | 6                       | 3                          |
| Checklists                                   | 6                           | 5                       | 6                          |
| Diagrams                                     | 7                           | 7                       | 7                          |
| Plans  | 8                           | 8                       | 8                          |
| Bills/Invoices                               | 9                           | 9                       | 11                         |
| Installation/Manufacturer's Instructions     | 10                          | 10                      | 10                         |
| Work Orders                                  | 11                          | 17                      | 9                          |
| Manufacturer's -<br>Brochures/Catalogues     | 12                          | 12                      | 12                         |
| Forms  | 13                          | 14                      | 13                         |
| Table/Charts/Graphs<br>(Building Code Books) | 14                          | 15                      | 14                         |
| Parts Numbers                                | 15                          | 11                      | 16                         |
| Technical/Reference<br>Manuals               | 16                          | 16                      | 15                         |
| Safety Rules<br>(Construction Regulations)   | 17                          | 13                      | 17                         |
| Tool/Equipment<br>Instructions               | 18                          | 18                      | 18                         |
| Trade Magazines                              | 19                          | 19                      | 20                         |
| Estimates                                    | 20                          | 20                      | 19                         |

## Importance of On-the-Job Reading Tasks

### Question #2

What are the opinions of entry and advanced level apprentices regarding the **importance** of identified on-the-job reading task during their on-the-job component of their apprenticeship training ?

### All Apprentices

Part C of the apprentices' questionnaire investigated the importance of the on-the-job reading tasks. Apprentices were asked to rate each reading task statement by "Strongly Agree", "Agree", "Undecided", "Disagree" or "Strongly Disagree". These were then converted into importance ratings of "Very Important"(1), "Important" (2), "Undecided" (3), "Unimportant" (4), "Very Unimportant" (5).

The reported importance for each of the 20 identified on-the-job reading task is presented in Table 9. If the mean for the reading task was  $\leq 2$ , indicating that it was either very important or important, then the task was deemed to be important. The important on-the-job reading tasks found for apprentices as a group were:

- a) blueprints(1.17),
- b) drawings or schematics(1.43),
- c) diagrams (1.52),
- d) directions (1.55),
- e) work orders (1.58),

- g) parts numbers (1.60),
- h) table/charts/graphs (building code books) (1.61),
- i) bills or invoices (1.63),
- j) plans (1.65),
- k) estimates (1.70),
- l) installation/manufacture's instructions (1.70),
- m) handwritten memos (1.74),
- n) safety rules (construction regulations) (1.74),
- o) checklists (1.75),
- p) forms (1.76),
- q) tool and equipment instructions (1.77),
- r) safety warnings (1.82), and
- s) technical or reference manuals (1.85).

That is, almost all tasks were deemed important; only two were not. It is interesting to note that while 55 respondents stated they never saw estimates, it had an importance rating of 1.70.

TABLE 9

Importance of On-the-Job Reading Tasks For Apprentices as a Group

| Task <sup>1</sup>                             | Importance     |             |           |               |                    | Mean      |
|---|----------------|-------------|-----------|---------------|--------------------|-----------|
|   | Very Important | Import- ant | Undecided | Unim- portant | Very Un- important |           |
| Frequency(Percentage)                         | f(%)           | f(%)        | f(%)      | f(%)          | f(%)               | $\bar{X}$ |
| Blueprints                                    | 73(83)         | 13(15)      | 1(1)      | 0(0)          | 0(0)               | 1.17      |
| Drawings/Schematics                           | 55(63)         | 27(31)      | 5(6)      | 0(0)          | 0(0)               | 1.43      |
| Diagrams                                      | 41(47)         | 44(50)      | 0(0)      | 0(0)          | 0(0)               | 1.52      |
| Directions                                    | 38(43)         | 47(54)      | 0(0)      | 0(0)          | 0(0)               | 1.55      |
| Work Orders                                   | 36(41)         | 50(57)      | 0(0)      | 0(0)          | 0(0)               | 1.58      |
| Parts Numbers                                 | 41(47)         | 41(47)      | 4(5)      | 1(1)          | 0(0)               | 1.60      |
| Table/Charts/Graphs<br>(Building Code Books)  | 40(45)         | 41(47)      | 6(7)      | 0(0)          | 0(0)               | 1.61      |
| Bills/Invoices                                | 41(47)         | 39(44)      | 5(6)      | 2(2)          | 0(0)               | 1.63      |
| Plans   | 37(42)         | 43(49)      | 5(6)      | 1(1)          | 0(0)               | 1.65      |
| Estimates                                     | 39(44)         | 36(41)      | 10(11)    | 0(0)          | 0(0)               | 1.70      |
| Installation/Manu-<br>facturer's Instructions | 38(43)         | 40(45)      | 6(7)      | 3(3)          | 0(0)               | 1.70      |
| Safety Rules<br>(Construction Regulations)    | 36(41)         | 42(48)      | 7(8)      | 3(3)          | 0(0)               | 1.74      |
| Handwritten Memos                             | 29(33)         | 48(55)      | 7(8)      | 0(0)          | 0(0)               | 1.74      |
| Checklists                                    | 22(25)         | 62(70)      | 1(1)      | 0(0)          | 0(0)               | 1.75      |
| Forms   | 26(30)         | 53(60)      | 4(5)      | 1(1)          | 0(0)               | 1.76      |
| Tool/Equipment<br>Instructions                | 25(28)         | 57(65)      | 5(6)      | 0(0)          | 0(0)               | 1.77      |
| Safety Warnings                               | 40(45)         | 33(38)      | 5(6)      | 8(9)          | 1(1)               | 1.82      |
| Technical/Reference<br>Manuals                | 20(23)         | 60(68)      | 3(3)      | 2(2)          | 0(0)               | 1.85      |
| Manufacturer's -<br>Brochures/Catalogues      | 16(18)         | 44(50)      | 16(18)    | 8(9)          | 0                  | 2.19      |
| Trade Magazines                               | 8(9)           | 41(47)      | 26(30)    | 10(11)        | 1(1)               | 2.45      |

<sup>1</sup> Due to rounding and because of lack of responses on certain tasks, 100% may not be achieved.

### Entry Level Apprentices

The results of the importance rating for entry level apprentices are presented in Table 10. The important on-the-job reading tasks for entry level apprentices were the same as for the composite group, but in a different order of priority. The important reading tasks for this group were:

- a) blueprints (1.13),
- b) drawings or schematics(1.49),
- c) diagrams (1.51),
- d) directions (1.51),
- e) work orders (1.51),
- f) parts numbers (1.62),
- g) table/charts/graphs (building code books) (1.64),
- h) estimates (1.65),
- i) bills or invoices (1.67),
- j) safety warnings (construction regulations) (1.67),
- k) tool and equipment instructions (1.67),
- l) technical or reference manuals (1.70),
- m) safety rules (1.72),
- n) forms (1.72),
- o) installation/manufacture's instructions (1.77),
- p) handwritten memos/instructions (1.75),
- q) checklists (1.78), and
- r) plans (1.80).

TABLE 10

Importance of On-the-Job Reading Tasks for Entry Level Apprentices

| Task <sup>1</sup>                             | Importance        |                |           |                  |                       | Mean<br>$\bar{X}$ |
|---|-------------------|----------------|-----------|------------------|-----------------------|-------------------|
|   | Very<br>Important | Import-<br>ant | Undecided | Unim-<br>portant | Very Un-<br>important |                   |
| Frequency(Percentage)                         | f(%)              | f(%)           | f(%)      | f(%)             | f(%)                  |                   |
| Blueprints                                    | 34(40)            | 5(6)           | 0(0)      | 0(0)             | 0(0)                  | 1.13              |
| Drawings/Schematics                           | 22(26)            | 15(18)         | 2(2)      | 0(0)             | 0(0)                  | 1.49              |
| Diagrams                                      | 18(22)            | 19(23)         | 0(0)      | 0(0)             | 0(0)                  | 1.51              |
| Directions                                    | 18(22)            | 19(23)         | 0(0)      | 0(0)             | 0(0)                  | 1.51              |
| Work Orders                                   | 18(22)            | 19(23)         | 0(0)      | 0(0)             | 0(0)                  | 1.51              |
| Parts Numbers                                 | 19(22)            | 17(20)         | 2(2)      | 1(1)             | 0(0)                  | 1.62              |
| Table/Charts/Graphs<br>(Building Code Books)  | 18(21)            | 17(20)         | 4(5)      | 0(0)             | 0(0)                  | 1.64              |
| Estimates                                     | 18(22)            | 14(17)         | 5(6)      | 0(0)             | 0(0)                  | 1.65              |
| Bills/Invoices                                | 19(22)            | 15(18)         | 4(5)      | 1(1)             | 0(0)                  | 1.67              |
| Safety Warnings<br>(Construction Regulations) | 19(22)            | 17(20)         | 1(1)      | 1(1)             | 1(1)                  | 1.67              |
| Tool/Equipment<br>Instructions                | 14(16)            | 23(27)         | 2(2)      | 0(0)             | 0(0)                  | 1.70              |
| Technical/Reference<br>Manuals                | 12(14)            | 24(29)         | 1(1)      | 0(0)             | 0(0)                  | 1.70              |
| Safety Rules                                  | 18(21)            | 16(19)         | 3(4)      | 2(2)             | 0(0)                  | 1.72              |
| Forms   | 12(15)            | 22(27)         | 2(2)      | 0(0)             | 0(0)                  | 1.72              |
| Handwritten Memos                             | 13(16)            | 19(23)         | 4(5)      | 0(0)             | 0(0)                  | 1.75              |
| Installation/Manu-<br>facturer's Instructions | 16(19)            | 18(21)         | 3(4)      | 2(2)             | 0(0)                  | 1.77              |
| Checklists                                    | 8(10)             | 29(35)         | 0(0)      | 0(0)             | 0(0)                  | 1.78              |
| Plans   | 13(15)            | 22(26)         | 3(4)      | 1(1)             | 0(0)                  | 1.80              |
| Manufacturer's -<br>Brochures/Catalogues      | 5(6)              | 21(26)         | 7(9)      | 4(5)             | 0(0)                  | 2.27              |
| Trade Magazines                               | 1(1)              | 19(23)         | 15(18)    | 3(4)             | 0(0)                  | 2.53              |

<sup>1</sup> Due to rounding and because of lack of responses on certain tasks, 100% may not be achieved.

### Advanced Level Apprentices

The results of the importance rating for advanced level apprentices are presented in Table 11. The important on-the-job reading tasks for advanced level apprentices were the same as for the composite group, but in a different order of priority. The important reading tasks for this group were:

- a) blueprints (1.20),
- b) drawings or schematics (1.35),
- c) diagrams (1.52),
- d) plans (1.52),.
- e) directions (1.57),
- f) parts numbers (1.59),
- g) table/charts/graphs (building code books) (1.59),
- h) bills or invoices (1.59),
- i) work orders (1.63),
- j) estimates (1.65),
- k) installation/manufacture's instructions (1.65),
- l) handwritten memos (1.72),
- m) checklists, (1.72), and
- n) safety rules (1.76),
- o) forms (1.78),
- p) tool and equipment instructions (1.85),
- q) safety warnings (construction regulations) (1.91), and
- r) technical or reference manuals (1.96).

TABLE 11

## Importance of On-the-Job Reading Tasks for Advanced Level Apprentices

| Task <sup>1</sup>                             | Importance        |                |           |                  |                          | Mean<br>$\bar{X}$ |
|---|-------------------|----------------|-----------|------------------|--------------------------|-------------------|
|   | Very<br>Important | Import-<br>ant | Undecided | Unim-<br>portant | Very<br>Un-<br>important |                   |
| Frequency(Percentage)                         | f(%)              | f(%)           | f(%)      | f(%)             | f(%)                     |                   |
| Blueprints                                    | 38(45)            | 7(8)           | 1(1)      | 0(0)             | 0(0)                     | 1.20              |
| Drawings/Schematics                           | 32(38)            | 12(14)         | 2(2)      | 0(0)             | 0(0)                     | 1.35              |
| Diagrams                                      | 22(27)            | 24(29)         | 0(0)      | 0(0)             | 0(0)                     | 1.52              |
| Directions                                    | 20(24)            | 26(33)         | 0(0)      | 0(0)             | 0(0)                     | 1.57              |
| Parts Numbers                                 | 21(25)            | 23(27)         | 0(0)      | 0(0)             | 0(0)                     | 1.59              |
| Table/Charts/Graphs<br>(Building Code Books)  | 21(25)            | 23(27)         | 2(2)      | 0(0)             | 0(0)                     | 1.59              |
| Bills/Invoices                                | 22(26)            | 22(26)         | 1(1)      | 1(1)             | 0(0)                     | 1.59              |
| Plans   | 24(28)            | 20(24)         | 2(2)      | 0(0)             | 0(0)                     | 1.52              |
| Work Orders                                   | 17(20)            | 29(35)         | 0(0)      | 0(0)             | 0(0)                     | 1.63              |
| Estimates                                     | 21(25)            | 20(24)         | 5(6)      | 0(0)             | 0(0)                     | 1.65              |
| Installation/Manu-<br>facturer's Instructions | 21(25)            | 21(25)         | 3(4)      | 0(0)             | 0(0)                     | 1.65              |
| Handwritten Memos                             | 16(20)            | 27(33)         | 3(4)      | 0(0)             | 0(0)                     | 1.72              |
| Checklists                                    | 14(17)            | 31(37)         | 1(1)      | 0(0)             | 0(0)                     | 1.72              |
| Safety Rules                                  | 17(20)            | 24(28)         | 4(5)      | 1(1)             | 0(0)                     | 1.76              |
| Forms   | 14(17)            | 29(35)         | 2(2)      | 1(1)             | 0(0)                     | 1.78              |
| Tool/Equipment<br>Instructions                | 10(12)            | 33(39)         | 3(4)      | 0(0)             | 0(0)                     | 1.85              |
| Safety Warnings<br>(Construction Regulations) | 20(23)            | 16(18)         | 4(5)      | 6(7)             | 0(0)                     | 1.91              |
| Technical/Reference<br>Manuals                | 8(10)             | 34(41)         | 2(2)      | 2(2)             | 0(0)                     | 1.96              |
| Manufacturer's -<br>Brochures/Catalogues      | 11(13)            | 21(26)         | 9(11)     | 4(5)             | 0(0)                     | 2.13              |
| Trade Magazines                               | 7(8)              | 20(24)         | 11(13)    | 7(8)             | 1(1)                     | 2.46              |

<sup>1</sup> Due to rounding and because of lack of responses on certain tasks, 100% may not be achieved.

### Comparison of Groups

Table 12 presents a comparison of means for importance rating for the composite group and the entry and advanced level groups. Any discrepancies in the figures was due to the inclusion of three apprentices in the composite group who did not provide information on their level on the questionnaire.

Table 13 presents the order of priority for importance rating for the different groups. While the majority of the reading tasks had similar importance ratings (a difference of three or less), seven tasks had dissimilar ratings for entry and advanced level apprentices. These were:

- work orders (entry = 5, advanced = 9),
- plans (entry = 18, advanced = 4),
- installation/manufacture's instructions (entry = 16, advanced = 11),
- checklists (entry = 17, advanced = 13),
- tool/equipment instructions (entry = 11, advanced = 16),
- safety warnings (entry = 10, advanced = 17), and
- technical/reference manuals (entry = 12, advanced = 18).

For work orders, the differences may be contributed to the experience that entry level apprentices see work orders less frequently than advanced level apprentices, and therefore, they may rate them as being more important due to this rarity. For the task of tool/equipment instruction and technical/reference manuals, entry level apprentices may rate them as being more important because they are not as sure of their abilities and knowledge as advanced level apprentices. The same idea may be applicable to the reading task of safety warnings. Work sites may be unfamiliar to entry level apprentices.

TABLE 12

Means for Importance of On-the-Job Reading Tasks

| Task  | Importance             |                    |                       |
|---|------------------------|--------------------|-----------------------|
|   | Composite<br>$\bar{X}$ | Entry<br>$\bar{X}$ | Advanced<br>$\bar{X}$ |
| Blueprints                                    | 1.17                   | 1.13               | 1.20                  |
| Drawings/Schematics                           | 1.43                   | 1.49               | 1.35                  |
| Diagrams                                      | 1.52                   | 1.51               | 1.52                  |
| Directions                                    | 1.55                   | 1.51               | 1.57                  |
| Work Orders                                   | 1.58                   | 1.51               | 1.63                  |
| Parts Numbers                                 | 1.60                   | 1.62               | 1.59                  |
| Table/Charts/Graphs<br>(Building Code Books)  | 1.61                   | 1.64               | 1.59                  |
| Bills/Invoices                                | 1.63                   | 1.67               | 1.59                  |
| Plans   | 1.65                   | 1.80               | 1.52                  |
| Estimates                                     | 1.70                   | 1.65               | 1.65                  |
| Installation/Manu-<br>facturer's Instructions | 1.70                   | 1.77               | 1.65                  |
| Safety Rules<br>(Construction Regulations)    | 1.74                   | 1.72               | 1.76                  |
| Handwritten Memos                             | 1.74                   | 1.75               | 1.72                  |
| Checklists                                    | 1.75                   | 1.78               | 1.72                  |
| Forms   | 1.76                   | 1.72               | 1.78                  |
| Tool/Equipment<br>Instructions                | 1.77                   | 1.70               | 1.85                  |
| Safety Warnings                               | 1.82                   | 1.67               | 1.91                  |
| Technical/Reference<br>Manuals                | 1.85                   | 1.70               | 1.96                  |
| Manufacturer's -<br>Brochures/Catalogues      | 2.19                   | 2.27               | 2.13                  |
| Trade Magazines                               | 2.45                   | 2.53               | 2.46                  |

TABLE 13

Priority of Order for Importance of On-the-Job Reading Tasks

| Task   | Importance                  |                         |                            |
|--|-----------------------------|-------------------------|----------------------------|
|  | Composite<br>Priority Order | Entry<br>Priority Order | Advanced<br>Priority Order |
| Blueprints                                   | 1                           | 1                       | 1                          |
| Drawings/Schematics                          | 2                           | 2                       | 2                          |
| Diagrams                                     | 3                           | 3                       | 3                          |
| Directions                                   | 4                           | 4                       | 5                          |
| Work Orders                                  | 5                           | 5                       | 9                          |
| Parts Numbers                                | 6                           | 6                       | 6                          |
| Table/Charts/Graphs<br>(Building Code Books) | 7                           | 7                       | 7                          |
| Bills/Invoices                               | 8                           | 9                       | 8                          |
| Plans  | 9                           | 18                      | 4                          |
| Estimates                                    | 10                          | 8                       | 10                         |
| Installation/Manufacturer's<br>Instructions  | 11                          | 16                      | 11                         |
| Safety Rules<br>(Construction Regulations)   | 12                          | 13                      | 14                         |
| Handwritten Memos                            | 13                          | 15                      | 12                         |
| Checklists                                   | 14                          | 17                      | 13                         |
| Forms  | 15                          | 14                      | 15                         |
| Tool/Equipment<br>Instructions               | 16                          | 11                      | 16                         |
| Safety Warnings                              | 17                          | 10                      | 17                         |
| Technical/Reference<br>Manuals               | 18                          | 12                      | 18                         |
| Manufacturer's -<br>Brochures/Catalogues     | 19                          | 19                      | 19                         |
| Trade Magazines                              | 20                          | 20                      | 20                         |

## Training Emphasis of On-the-Job Reading Tasks

### Question #3

What should be the **training emphases** of the identified on-the-job reading tasks for entry and advanced level apprentices.?

The results of determination of training emphasis for each of the 20 on-the-job reading tasks are shown in Table 14. The training emphasis for each task was decided by examining the importance and frequency for each task. If importance was high ( $\leq 2$ ) and the frequency of performance was high ( $< 3$ ), then the emphasis was to train. If importance was high and the frequency of performance was moderate or low ( $\geq 3$ ), then the emphasis was to over-train. If importance was low ( $> 2$ ), and frequency of performance was "2-3 times a week", "once a week", or "once a month", then the emphasis was to train. With a low importance rating, and a frequency of "daily" or "never", then the emphasis was no training.

### Entry Level Apprentices

The training emphasis of on-the-job reading tasks for entry level apprentices are presented in Table 15.

### Advanced Level Apprentices

The training emphasis of on-the-job reading tasks for advanced level apprentices are presented in Table 16.

TABLE 14

Training Emphasis for On-the-Job Reading Tasks For Apprentices as a Group

| Reading Task                               | Importance<br>$\bar{X}$ | Frequency<br>$\bar{X}$ | Training Emphasis |
|--|-------------------------|------------------------|-------------------|
| Blueprints                                 | 1.172                   | 2.614                  | Train             |
| Drawing/schematics                         | 1.425                   | 2.345                  | Train             |
| Directions                                 | 1.553                   | 2.609                  | Train             |
| Handwritten Memos                          | 1.738                   | 2.670                  | Train             |
| Checklists                                 | 1.753                   | 2.750                  | Train             |
| Safety Warnings                            | 1.816                   | 2.318                  | Train             |
| Diagrams                                   | 1.518                   | 3.045                  | Over-train        |
| Work Orders                                | 1.581                   | 3.409                  | Over-train        |
| Parts Numbers                              | 1.598                   | 3.598                  | Over-train        |
| Table/Chart/Graphs<br>(Building Code Book) | 1.609                   | 3.455                  | Over-train        |
| Bills/Invoices                             | 1.632                   | 3.322                  | Over-train        |
| Plans                                      | 1.651                   | 3.045                  | Over-train        |
| Estimates                                  | 1.659                   | 4.159                  | Over-train        |
| Installation/Manufacturer's Instructions   | 1.701                   | 3.318                  | Over-train        |
| Safety Rules<br>(Construction Regulations) | 1.739                   | 3.670                  | Over-train        |
| Forms                                      | 1.762                   | 3.455                  | Over-train        |
| Tool/Equipment Instructions                | 1.770                   | 3.750                  | Over-train        |
| Technical/Reference Manuals                | 1.847                   | 3.614                  | Over-train        |
| Manufacturer's Brochures/<br>Catalogues    | 2.190                   | 3.432                  | Train             |
| Trade Magazines                            | 2.477                   | 4.125                  | No-training       |

TABLE 15

Training Emphasis for Entry Level Apprentices

| Reading Task                                  | Importance<br>$\bar{X}$ | Frequency<br>$\bar{X}$ | Training Emphasis |
|---|-------------------------|------------------------|-------------------|
| Blueprints                                    | 1.128                   | 2.487                  | Train             |
| Drawing/schematics                            | 1.490                   | 2.282                  | Train             |
| Directions                                    | 1.514                   | 2.684                  | Train             |
| Safety Warnings                               | 1.667                   | 2.128                  | Train             |
| Handwritten Memos                             | 1.750                   | 2.846                  | Train             |
| Checklists                                    | 1.784                   | 2.795                  | Train             |
| Diagrams                                      | 1.514                   | 3.128                  | Over-train        |
| Work Orders                                   | 1.516                   | 3.744                  | Over-train        |
| Table/Chart/Graphs<br>(Building Code Book)    | 1.641                   | 3.590                  | Over-train        |
| Parts Numbers                                 | 1.645                   | 3.462                  | Over-train        |
| Estimates                                     | 1.649                   | 4.205                  | Over-train        |
| Bills/Invoices                                | 1.667                   | 3.289                  | Over-train        |
| Tool/Equipment<br>Instructions                | 1.692                   | 3.769                  | Over-train        |
| Technical/Reference<br>Manuals                | 1.703                   | 3.718                  | Over-train        |
| Safety Rules<br>(Construction Regulations)    | 1.718                   | 3.564                  | Over-train        |
| Forms   | 1.722                   | 3.590                  | Over-train        |
| Installation/Manu-<br>facturer's Instructions | 1.769                   | 3.410                  | Over-train        |
| Plans   | 1.795                   | 3.128                  | Over-train        |
| Manufacturer's Brochures/<br>Catalogues       | 2.270                   | 3.513                  | Train             |
| Trade Magazines                               | 2.526                   | 4.154                  | No-training       |

TABLE 16

## Training Emphasis for Advanced Level Apprentices

| Reading Task                               | Importance<br>$\bar{X}$ | Frequency<br>$\bar{X}$ | Training Emphasis |
|--|-------------------------|------------------------|-------------------|
| Blueprints                                 | 1.196                   | 2.674                  | Train             |
| Drawing/schematics                         | 1.348                   | 2.365                  | Train             |
| Diagrams                                   | 1.522                   | 2.978                  | Train             |
| Directions                                 | 1.565                   | 2.630                  | Train             |
| Handwritten Memos                          | 1.717                   | 2.478                  | Train             |
| Checklists                                 | 1.717                   | 2.783                  | Train             |
| Safety Warnings                            | 1.913                   | 2.457                  | Train             |
| Plans                                      | 1.522                   | 3.000                  | Over-train        |
| Bills/Invoices                             | 1.587                   | 3.391                  | Over-train        |
| Table/Chart/Graphs<br>(Building Code Book) | 1.587                   | 3.435                  | Over-train        |
| Parts Numbers                              | 1.587                   | 3.739                  | Over-train        |
| Work Orders                                | 1.630                   | 3.174                  | Over-train        |
| Installation/Manufacturer's Instructions   | 1.652                   | 3.283                  | Over-train        |
| Estimates                                  | 1.652                   | 4.130                  | Over-train        |
| Safety Rules<br>(Construction Regulations) | 1.761                   | 3.761                  | Over-train        |
| Forms                                      | 1.783                   | 3.391                  | Over-train        |
| Tool/Equipment Instructions                | 1.848                   | 3.804                  | Over-train        |
| Technical/Reference Manuals                | 1.957                   | 3.587                  | Over-train        |
| Manufacturer's Brochures/<br>Catalogues    | 2.133                   | 3.391                  | Train             |
| Trade Magazines                            | 2.457                   | 4.152                  | No training       |

### Comparison of the Groups

As a composite group, the reading tasks with high importance and high frequency of performance, thus having a training emphasis of "train" were :

- a) blueprints,
- b) drawings/schematics,
- c) directions,
- d) handwritten memos,
- e) checklists, and
- f) safety warnings.

The same training emphasis for these six reading tasks was determined for entry level apprentices. For advanced level apprentices, the training emphasis for the on-the-job reading task of "diagrams" was to train, whereas for the other group, it was to over-train. This change in emphasis may be attributed to the difference in frequency of performance, because advanced level apprentices perform this task more frequently the skill needed to perform this task will be maintained through use on the work site.

The training emphasis for the on-the-job reading task of "manufacturer's brochures and catalogues" was "train". This is attributed to the low importance and moderate frequency of importance. No training is recommended for the reading task of "trade magazines" because of its low importance and low frequency of performance. For all other reading tasks, the training emphasis

was to "over-train". This is due to the moderate frequency of performance, but high level of importance.

### Importance and Frequency as Factors for Determining Training Emphasis

The need to include both factors of importance and frequency when determining training emphasis, can best be portrayed by comparing the priority orders of the factors for the groups.

Apprentices identified which tasks they perceived as performing most frequently on the job, on average, between 2-3 times a week and once a week. The five most frequently performed tasks were: safety warnings, drawings/schematics, directions, blueprints, handwritten memos/ instructions and checklists. None of the tasks was "never" used, although, trade magazines and estimates were read only once a month.

While apprentices perceived that they used five on-the-job reading tasks on a frequent basis, they stated that all on-the-job reading tasks, but two, manufacturer's brochures and catalogues and trade magazines, were either very important or important.

Ten on-the-job reading tasks had similar ranks for frequency and importance : bills/invoices, blueprints, directions, drawings/schematics, forms, installation/manufacturer's instruction, plans, technical/reference manuals, tool/equipment instructions, and trade magazines. The results are presented in Table 17.

Tasks having a higher rank of frequency than of importance are presented in Table 18. Of these tasks, the most notable one is safety warnings with the largest difference between the frequency rank (1) and the importance rank (17).

Tasks having a higher importance rank than frequency are presented in Table 19. The two most notable of these tasks are estimates and parts numbers with differences of ten and nine respectively.

TABLE 17

Reading Tasks with Similar Frequency and Importance Priority Orders

| Priority Order |            | On-the-Job Reading Task                  |
|----------------|------------|--|
| Frequency      | Importance |  |
| 9              | 8          | Bills/Invoices                           |
| 3              | 1          | Blueprints                               |
| 4              | 4          | Directions                               |
| 2              | 2          | Drawings/Schematics                      |
| 13             | 15         | Forms                                    |
| 8              | 9          | Plans                                    |
| 10             | 11         | Installation/Manufacturer's Instructions |
| 16             | 18         | Technical/Reference Manuals              |
| 18             | 16         | Tool/Equipment Instructions              |
| 19             | 20         | Trade Magazines                          |

TABLE 18

On-the-Job Reading Tasks with Higher Frequency Priority Order

| Priority Order |            | On-the-Job Reading Task             |
|----------------|------------|-------------------------------------|
| Frequency      | Importance |                                     |
| 1              | 17         | Safety Warnings                     |
| 5              | 13         | Handwritten Memos                   |
| 6              | 14         | Checklists                          |
| 12             | 19         | Manufacturer's Brochures/Catalogues |

TABLE 19

On-the-Job Reading Tasks with Higher Importance Priority Order

| Priority Order |           | On-the-Job Reading Task                    |
|----------------|-----------|--|
| Importance     | Frequency |  |
| 3              | 7         | Diagrams                                   |
| 5              | 11        | Work Orders                                |
| 6              | 15        | Parts Numbers                              |
| 7              | 14        | Tables/Charts/Graphs (Building Code Books) |
| 10             | 20        | Estimates                                  |
| 12             | 17        | Safety Rules (Construction Regulations)    |

## Perceptions of Entry and Advanced Level Apprentices

### Question #4

What differences exist between the perception of entry and advanced level apprentices concerning the frequency of on-the-job reading tasks, and the importance of on-the-job reading tasks?

The data for this section was derived from the apprentices responses to Part B of the questionnaire for frequency and Part C for importance. In this section, tables illustrate the results of the independent t-test for the on-the-job tasks identified having the largest difference of means for entry and advanced level apprentices, for either frequency or importance.

### Frequency

The on-the-job reading task of work orders (.57) was identified as the task on which to conduct a t-test regarding differences of perceptions for frequency for entry and advanced level apprentices. The results are presented in Table 20.

### Importance

The on-the-job reading task of plans (.28) was identified as the task on which to conduct a t-test to examine the differences of perceptions for importance for entry and advanced level apprentices. The results are presented in Table 21.

As no significant differences was found at the .05 level between groups, no further t-tests were conducted for either frequency or importance.

TABLE 20

Entry and Advanced Level Apprentices' Perception Regarding the  
Frequency of On-the-Job Reading Tasks

| Reading Task | Group    | N  | $\bar{X}$ | SD   | Pooled Variance Estimate |      |      |
|--------------|----------|----|-----------|------|--------------------------|------|------|
|              |          |    |           |      | df                       | p    | t    |
| Work Orders  | Entry    | 39 | 3.74      | 1.50 | 83                       | .091 | 1.71 |
|              | Advanced | 46 | 3.17      | 1.55 |                          |      |      |

TABLE 21

Entry and Advanced Level Apprentices' Perception Regarding the  
Importance of On-the-Job Reading Tasks

| Reading Task | Group    | N  | $\bar{X}$ | SD   | Pooled Variance Estimate |      |      |
|--------------|----------|----|-----------|------|--------------------------|------|------|
|              |          |    |           |      | df                       | p    | t    |
| Plans        | Entry    | 39 | 1.80      | 0.70 | 83                       | .053 | 1.97 |
|              | Advanced | 46 | 1.52      | 0.59 |                          |      |      |

### Summary of Responses to Open-Ended Question in Part D

In Part D of the survey questionnaire, respondents were given an opportunity to provide any additional comments or suggestions in an open ended question. The investigator was able to categorize their responses into seven categories. Each category and a sample of replies are presented below.

- 1) The answers will depend on the type of job one is on (4 responses).

"Need to see the job site".

"If you are in charge of a job then you will have more responsibilities and your answers will change."

- 2) Verbal communication is important (4 responses).

"Most of the time things are discussed verbally (how to do the job) or there is someone there, that is familiar with every aspect of the job to show you what to do, to read everything, all the time takes too long."

"I feel that comprehension of verbal instructions is more important to the apprentice than accurate reading."

- 3) Some questions do not apply to apprentices (4 responses).

"I don't even come close to some of this stuff, e.g. handwritten memos, work orders."

4) Comments on the design of the questionnaire (2 responses).

"Choices should have been less specific, eg. occasionally."

5) Political commentary (2 responses).

"People should be more informed on unions."

"Monopolization of information is a part of maintaining the power infrastructure on construction sites in groups exceeding five people."

6) Do more writing than reading (2 response).

"Do more writing of estimates, invoices, memos, etc., than the reading of them."

7) Suggestion for course (1 response).

"I strongly believe that the apprenticeship courses should look at the trades in a business way, such as estimating jobs, bidding, responsibilities of general contractors. This should be done in a way that it keeps up with the construction community, i.e. pricing, cost of manpower, materials. This could be an extra course for students who find this information interesting and needed."

## Summary

The apprentices participating in this study appear to adequately reflect the composition of apprentices in the construction trades. All construction categories were represented : 36(41%) in carpentry, 28(32%) in electrical, and 24(27%) in mechanical. There was a fairly even division between entry level and advanced level apprentices : 39(44%) at the entry level, and 46(52%) at the advanced level.

On-the-job reading tasks were deemed frequent if they occurred on a "Daily" "2-3 Times a Week" or "Weekly" basis. Apprentices, as a composite group, identified six frequently used on-the-job reading tasks : safety warnings, drawings/schematics, directions, handwritten memos/ instructions and checklists. Entry level apprentices identified the same six frequent on-the-job reading tasks as the composite group. Advanced level apprentices had two additional frequently used reading tasks: diagrams and plans. The least frequently used reading tasks, trade magazines and estimates, were used on a "Once a Month" basis, by all three groups. While the order of priority was similar for most of the on-the-job reading tasks for entry and advanced level apprentice groups, three tasks were remarkable for their difference in order of priority: work orders (entry = 17, advanced = 9), parts numbers (entry = 11, advanced = 16), and safety rules (entry = 13 and advanced = 17).

Of the 20 on-the-job reading tasks presented in this study, only two, trade magazines and manufacturer's brochures/catalogues were not identified as being very important or important by all three

groups in the study. Entry and advanced level apprentices rated the same on-the-job reading tasks as being important, but the order of priority was different for eight of them : work orders, plans, estimates, installation/manufacture's instructions, checklists, tool and equipment instructions, safety warnings, and technical and reference manuals. An interesting note in this section was that while 55 respondents stated they never read estimates, the task had an importance rating of 1.70.

The training emphasis of each on-the-job reading task was established using frequency of performance and importance means. For entry level apprentices, six on-the-job reading tasks were identified as having high importance and frequency levels for a training emphasis of "train". These were: blueprints, drawings/schematics, directions, safety warnings, handwritten memos/instructions, and checklists. For advanced level apprentices, the training emphasis of "train" was established for the same six on-the-job reading tasks and for the task of "diagrams". For the rest of the reading tasks, the training emphasis remained the same.

The necessity of using both frequency and importance to establish training emphasis was demonstrated when comparisons were made on the priority orders of these two factors. While ten tasks had similar frequency and importance ratings, six had higher priority given to frequency and four had higher priority for importance. The most notable tasks for the former were safety warnings and handwritten memos, for the latter, estimates and parts numbers.

For the investigation of the perceptions of entry and advanced level apprentices regarding the frequency and importance of on-the-job reading tasks, t-tests were conducted on the tasks having the maximum difference between the means. The on-the-job reading tasks of work orders, for the variable of frequency, and plans, for the variable of importance, were selected for further examination. No significance difference was found for either task.

In summary, this study may have contributed the following ideas for the field of occupational literacy in Manitoba. Apprentices in seven construction trades in Manitoba have indicated that they do perform identified on-the-job reading tasks during their work-based component of apprenticeship training. Additionally, all but two of these tasks were identified as being important. This indicates that the list of on-the-job reading tasks, developed by Smith (1974, 1975, 1979), for occupations within the construction cluster may be expanded within a Manitoban context.

Past studies (Chang,1983; Edwards & Gould,1987; Mikulecky & Diehl,1980; Taylor & Lewe,1990) have included the variables of frequency and importance. The necessity of including both frequency and importance for on-the-job reading tasks was demonstrated in this study when the priority of order was explored. This highlighted differences in the perceptions of entry and advanced level apprentices, which may be attributable to the varying degrees of experience and responsibilities of apprentices.

Although no significant differences were found for these variables, it would appear to be an area worthy of further exploration.

While Taylor and Lewie (1990) used a Task Matrix Technique, this study, an adaptation of Sage and Rose's (1985) subject matter analysis technique was used to determine the training emphasis for on-the-job reading tasks. Both show potential for targeting areas in apprenticeship training.

## CHAPTER V

### SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

#### Objective of the Study

The purpose of this study was to investigate the on-the-job reading tasks of apprentices in seven designated construction trades in Manitoba. The research questions addressed by this study were :

1. With what **frequency** do entry and advanced level apprentices perform identified on-the-job reading tasks during their on-the-job component of their apprenticeship training ?
2. What are the opinions of entry and advanced level apprentices regarding the **importance** of identified on-the-job reading tasks during their on-the-job component of their apprenticeship training ?
3. What should be the **training emphases** of the identified on-the-job reading tasks for entry and advanced level apprentices ?
4. What **differences** exist between the perceptions of entry and advanced level apprentices concerning the frequency of on-the-job reading tasks, and the importance of on-the-job reading tasks?

### Research Procedures

The following methodology was utilized in conducting the research :

- 1) A listing of all apprentices registered with the Apprenticeship and Training Branch was obtained. Then, using a randomized blocking procedure, a sample of 192 apprentices, representing all levels of training, in seven construction trades; cabinetmaker, carpenter, construction electrician, power electrician, plumber, steamfitter, and sprinkler and fire protection installer ,was identified.
- 2) Through a literature review and verification by employers and apprenticeship counsellors, 20 on-the-job reading tasks for apprentices in seven designated construction trades were identified. These were then used to develop a questionnaire designed to collect the apprentices' perception of frequency of use and importance for the reading tasks.

### Data Collection

Data was collected through a survey questionnaire sent to a sample of 190 apprentices in seven designated construction trades. Initial contact was made through a mail out of a package on September 14, 1990. The package contained a covering letter, the survey questionnaire and a self-addressed, stamped return envelope. A follow-up package including similar material to the first was mailed out on October 11, 1990. In both cases, Apprenticeship and Training

Branch letterhead was used to stimulate responses and a two week deadline for responses was given.

A random sample of non-respondents were contacted by telephone to assess reasons for non-participation. This was accomplished in order to determine if there were any differences between respondents and non-respondents which may have biased the study.

### Data Analysis

Descriptive statistics were used to analyze the data from the returned questionnaires. A reading task was deemed frequent if its mean was  $\leq 3$ , indicating that it was used at least on "a once a week" basis. If the mean for importance was  $\leq 2$ , the reading task was deemed important. The factors of frequency of use and importance for the reading task, as outlined by Sage and Rose (1985), were used to establish the training emphasis for each task. In addition to the descriptive statistics used throughout this study, t-tests were used to determine if there were significant differences in how entry and advanced level apprentices perceived selected on-the-job reading tasks. The reading tasks selected for examination were determined by the differences in their means.

### Summary of Findings

The findings outlined in this section are summarized in relation to the four major questions established.

#### Question #1.

With what **frequency** do entry and advanced level apprentices perform identified on-the-job reading tasks during their on-the-job component of their apprenticeship training ?

The apprentices were presented with 20 questions, asking them to rate how frequently they used each on-the-job reading task. If the mean for the on-the-job reading task was  $\leq 3$ , indicating that it was used on at least a weekly basis, then the task was deemed to be frequent. The frequent on-the-job reading tasks found for the composite group for this study were ;

- safety warnings,
- drawings/schematics,
- directions,
- blueprints,
- handwritten memos/instructions, and
- checklists.

Entry level apprentices identified the same six on-the-job reading tasks for frequency of use. In addition to these six reading tasks, advanced level apprentices identified diagrams and checklists. For

the majority of the reading tasks, the order of priority for frequency of use for the two groups was similar; however, there were exceptions. Entry level apprentices used "work orders" less frequently while advanced level apprentices used "parts numbers" and "safety rules" less frequently.

While all of the reading tasks were used, those of "estimates" and "trade magazines " were used, on average, "once a month".

### Question #2

What are the opinions of entry and advanced level apprentices regarding the **importance** of identified on-the-job reading tasks during their on-the-job component of their apprenticeship training ?

The apprentices were presented with 20 questions, asking them to rate the importance of accuracy for the reading task. If the mean for the on-the-job reading task was  $\leq 2$ , indicating that it was either very important or important, then the task was deemed to be frequent. The important on-the-job reading tasks found for this study were ;

- blueprints,
- drawings/schematics,
- diagrams,
- directions,
- work orders,

- parts numbers,
- tables, charts and graphs (building code books),
- bills/invoices,
- plans,
- estimates,
- installation/ manufacturer's instructions,
- safety rules (construction regulations),
- handwritten memos/ instructions,
- checklists,
- forms,
- tool/equipment instructions ,
- safety warnings, and
- technical/reference manuals.

Both groups, entry and advanced level apprentices, identified the same 18 on-the-job reading tasks as being important. However, in regards to the order of priority, there were notable differences, between the two groups for seven reading tasks. Entry level apprentices had a higher priority order for the reading tasks of work orders, tool and equipment instructions, safety warnings and technical/reference manuals. For advanced level apprentices the reading tasks of plans, installation/manufacturer's instructions, and checklists, had higher priority ratings.

A point of interest is the fact that while 63 percent of the apprentices never used estimates, 85 percent deemed them important.

### Question #3

What should be the **training emphases** on the identified on-the-job reading tasks for entry and advanced level apprentices ?

The training emphasis for each task was decided by examining the importance and frequency for each task. If importance was high ( $\leq 2$ ) and the frequency of performance was high ( $< 3$ ), then the emphasis was to train. If importance was high and the frequency of performance was moderate or low ( $\geq 3$ ), then the emphasis was to over-train. If importance was low ( $> 2$ ), and frequency of performance was "2-3 times a week", "once a week", or "once a month", then the emphasis was to train. With a low importance rating, and a frequency of "daily" or "never", then the emphasis was no training. This determination takes into account the maintenance and retention of skills needed to perform tasks, through practice on the work site.

The reading tasks with high importance and high frequency of performance, for a training emphasis of "train" were :

- a) blueprints,
- b) drawings/schematics,
- c) directions,
- d) handwritten memos,
- e) checklists, and
- f) safety warnings.

The same training emphasis for these six reading tasks was determined for entry level apprentices. For advanced level apprentices, the training emphasis for the on-the-job reading task of "diagrams" was to train, where as for the other two groups it was to over-train. This change in emphasis may be attributed to the difference in frequency of performance, because advanced level apprentices perform this task more frequently.

The training emphasis for the on-the-job reading task of "manufacturer's brochures and catalogues" was "train". This is attributed to the low importance and moderate frequency of importance. No training is recommended for the reading task of "trade magazines" because of its low importance and low frequency of performance. For all other reading tasks, the training emphasis was to "over-train". This is due to the moderate frequency of performance, but high level of importance.

The necessity of including both frequency of use and importance for the establishment of training emphasis was illustrated when a comparison of the orders of priority for frequency and importance was conducted. Ten on-the-job reading tasks had similar orders of priority for frequency and importance: bills/invoices, blueprints, directions, drawings/schematics, forms, installation/manufacturer's instruction, plans, technical/reference manuals, tool/equipment instructions, and trade magazines.

Of the remaining on-the-job reading tasks, four, safety warnings, handwritten memos/instructions, checklist, and manufacturer's

brochures and catalogues, had a higher rank of frequency than of importance. Of these, most notable is safety warnings with the largest difference between the frequency rank (1) and the importance rank (17).

The six tasks having a higher importance rank than frequency rank were; diagrams, work orders, part numbers, tables/charts and graphs, estimates and safety rules. The two most notable of these tasks were estimates and parts numbers with differences of ten and nine respectively.

#### Question #4

What differences exist between the perception of entry and advanced level apprentices concerning the frequency of on-the-job reading tasks, and the importance of on-the-job reading tasks?

For the variables of frequency and importance, the on-the-job reading tasks, having the maximum differences between the means for entry and advanced level apprentices, were selected for examination with t-tests. The reading tasks were work orders (.57) for frequency of performance, and plans (.28) for importance. As no significant differences were found for the perceptions of entry and advanced level apprentices no further t-tests were conducted.

## Conclusions

On the basis of the data collected and the findings of this study, the following conclusions have been reached.

1. It was concluded that apprentices did perceive themselves as reading on- the-job, which may be attributed to their responses regarding the frequency of use for the identified reading tasks, as all of them were used.
2. Accurate reading of work-related documents is important. This may be attributed to the fact that all but two, manufacturer's brochures/catalogues and trade magazines, of the on-the-job reading tasks were considered to be important.
3. It was concluded that the 20 on-the-job reading tasks presented in the study were confirmed by the apprentices as reading tasks used during their on-the-job training component of their apprenticeship.
4. Six on-the-job reading tasks, safety warnings, drawings/schematics, blueprints, directions, handwritten memos/instructions, and checklists, were considered by the composite group to be used on a frequent basis. Entry level apprentices identified the same six reading tasks as being frequent. Advanced level apprentices identified two more : diagrams and plans.
5. While the majority of on-the-job reading tasks had similar orders of priority for frequency, there were three which differed for

entry and advanced level apprentices. These were: work orders, parts numbers , and safety rules .

For the reading task of "work order", this difference may be a reflection of the added duties and responsibilities of advanced level apprentices. For the other tasks, parts numbers and safety rules (construction regulations) the difference may be contributed to advanced level apprentices' exposure to these tasks and the lesser need to refer to them to obtain required information.

6. Of the 20 on-the-job reading tasks presented in the survey to the apprentices, all but two, manufacturer's brochures/catalogues, were deemed as being important. All groups of apprentices, composite, entry level, and advanced level, identified the same on-the-job reading tasks as being either very important or important, although the order of priority differed.

For work orders, the differences may be contributed to the experience that entry level apprentices see work orders less frequently than advanced level apprentices, and therefore, they may rate them as being more important due to this rarity. For the task of tool/equipment instruction and technical/reference manuals, entry level apprentices may rate them as being more important because they are not as sure of their abilities and knowledge as advanced level apprentices. The same idea may be applicable to the reading task of safety warnings. Work sites may be unfamiliar to entry level apprentices. No explanation is

apparent for the differing ratings for the tasks of plans and checklists, for the frequency of use was similar for both.

7. It was necessary to consider both frequency and importance for determining the training emphasis of an on-the-job reading task. On-the-job reading tasks may not be used frequently, but have a high degree of importance attached to them, or they may be used frequently but not rated as highly for importance.
8. For entry level apprentices, six on-the-job reading tasks were determined to have both high levels of importance and frequency for a training emphasis of "train". These were blueprints, drawings/schematics, directions, safety warnings, handwritten memos/instructions, and checklists.
9. For advanced level apprentices, seven on-the-job reading tasks had high levels of importance and frequency for a training emphasis of "train". These were blueprints, drawings/schematics, directions, safety warnings, handwritten memos/instructions, checklists and diagrams. The inclusion of "diagrams" may be to the greater frequency which advanced level apprentices refer to this type of document.
10. While no significant differences were found regarding differences between the perceptions of entry and advanced level apprentices on the variables of importance and frequency, it appears that this is an area to be investigated in more detail in future studies.

### Recommendations for Apprenticeship Programming

The following recommendations are made by the investigator as a result of having conducted this study. The recommendations reflect the judgement of the investigator and are based on the findings and conclusions drawn from this study. It is recommended that :

- 1) Work be undertaken to dispel the misapprehension that trades occupations require little or no reading. (Lee, 1981; Myers, 1984; Siedow, 1983).
- 2) Apprenticeship curricula for the seven construction trades included in this study should be reviewed to verify that the on-the-job reading tasks identified in this study are included in formal preparatory training. (Chang, 1983; Taylor & Lewie, 1990; Thorton, 1980; Waugh, 1990).
- 3) The on-the-job reading tasks identified in this study (see Table 15) are common to a number of construction trades. Inclusion of these reading tasks in general preparatory vocational and apprenticeship training would allow the student the greatest degree of flexibility and transferability of common trades-related reading skills.
- 4) Work needs to be undertaken to examine, in greater detail, the differences between entry and advanced level apprenticeship on-the-job, so as to better tailor preparatory training.
- 5) Educators in the fields of pre-employment, vocational, and industrial education must be encouraged to include occupational literacy instruction in their courses.

- 6) Active efforts must be undertaken to increase the awareness of vocational, career and school counsellors of the "academic" demands of occupations in the construction trades.

### Recommendations for Future Research

Because of the limited research that has been conducted in this area, and the relative importance which studies can play in the near future, the following recommendations are made for future research.

- 1) It is recommended that more research needs to be undertaken to examine on-the-job reading tasks in other occupational areas, to shed some light on reading concerns.
- 2) On-site observations of apprentices to confirm the frequency and importance of on-the-job reading tasks of apprentices needs to be conducted. These observations must include the full range of job sites (small to large) and all levels of apprentices.
- 3) This type of study should be repeated in different geographical areas in Manitoba to examine the possibility of difference between the training in the areas.
- 4) It is recommended that this study be replicated using a national scale which would include: other trades, other geographical locations, and journey persons.
- 5) A trades-related literacy test which more accurately reflects and measures the actual reading tasks of the construction trades, needs to be developed.

- 6) The reliability of the instrument needs to be tested.
- 7) Further investigation into the perceptions of entry and advanced level apprentices regarding reading concerns needs to be conducted.

#### Weaknesses of the Study

There were faults with the wording of questions.

- 1) The terms safety rules and construction regulations were to be linked together. Question 7 of Part B was supposed to read "How many times do you read safety rules such as construction regulations ?"; Question 11 of Part C " It is not important to read safety rules such as construction regulations on the job ?".
- 2) In Questions 3 and 10 of Part B, the word "read" should have been used in place of "look at" and "see" to maintain consistency.
- 3) The word "important" should have been used throughout Part C of the questionnaire. This is particularly noticeable in Questions 2, 5, 8, 9,10, 13, 15, and 20.

## Appendix A

### PROPOSED ON-THE-JOB READING TASKS LIST

| DOCUMENT                      | FREQUENCY |                    |                |                     |                 |       | Not Applicable |
|-------------------------------|-----------|--------------------|----------------|---------------------|-----------------|-------|----------------|
|                               | Daily     | 2-3times<br>a week | Once a<br>week | 2-3times<br>a month | Once a<br>month | Never |                |
| BILLS                         |           |                    |                |                     |                 |       |                |
| BLUEPRINTS                    |           |                    |                |                     |                 |       |                |
| BUILDING CODES                |           |                    |                |                     |                 |       |                |
| BROCHURES                     |           |                    |                |                     |                 |       |                |
| CATALOGUES                    |           |                    |                |                     |                 |       |                |
| CHARTS                        |           |                    |                |                     |                 |       |                |
| CHECKLISTS                    |           |                    |                |                     |                 |       |                |
| CONSTRUCTION REGULATIONS      |           |                    |                |                     |                 |       |                |
| DIAGRAMS                      |           |                    |                |                     |                 |       |                |
| DIRECTIONS                    |           |                    |                |                     |                 |       |                |
| DRAWINGS                      |           |                    |                |                     |                 |       |                |
| ESTIMATES                     |           |                    |                |                     |                 |       |                |
| FORMS                         |           |                    |                |                     |                 |       |                |
| GRAPHS                        |           |                    |                |                     |                 |       |                |
| HANDWRITTEN MEMOS             |           |                    |                |                     |                 |       |                |
| HANDWRITTEN INSTRUCTIONS      |           |                    |                |                     |                 |       |                |
| INSTALLATION INSTRUCTIONS     |           |                    |                |                     |                 |       |                |
| JOB SHEETS                    |           |                    |                |                     |                 |       |                |
| MANUFACTURER'S INSTRUCTIONS   |           |                    |                |                     |                 |       |                |
| OPERATING MANUALS             |           |                    |                |                     |                 |       |                |
| PARTS NUMBERS                 |           |                    |                |                     |                 |       |                |
| PLANS                         |           |                    |                |                     |                 |       |                |
| REFERENCE MANUALS             |           |                    |                |                     |                 |       |                |
| TABLES                        |           |                    |                |                     |                 |       |                |
| TOOL/EQUIPMENT INSTRUCTIONS   |           |                    |                |                     |                 |       |                |
| TRADE MAGAZINES               |           |                    |                |                     |                 |       |                |
| TECHNICAL MANUALS             |           |                    |                |                     |                 |       |                |
| SAFETY WARNINGS/RULES/NOTICES |           |                    |                |                     |                 |       |                |
| WORK ORDERS                   |           |                    |                |                     |                 |       |                |

OTHER: please specify. \_\_\_\_\_

## Appendix B

### SUMMARY OF EMPLOYERS' REVIEW OF ON-THE-JOB READING TASKS LIST

| DOCUMENT                          | FREQUENCY |        |               |         |                  |
|-----------------------------------|-----------|--------|---------------|---------|------------------|
|                                   | DAILY     | WEEKLY | 2-3/<br>MONTH | MONTHLY | NEVER<br>NOT/APP |
| Bills/Invoices                    |           |        |               | CCEM    | C                |
| Blueprints                        | CME       | CC     |               |         |                  |
| Building Codes                    | M         | E      | C             | CC      | C                |
| Brochures (manufacturer's)        |           |        |               | CCCME   |                  |
| Catalogues (manufacturer's)       |           |        |               | CCM     | C                |
| Charts (Tables & Graphs)          |           | C      | CM            | C       | E                |
| Checklists                        | C         |        | CCM           | E       |                  |
| Construction Regulations(safety)  | C         | CCCM   | C             |         | E                |
| Diagrams                          | CEM       | C      |               |         | C                |
| Directions                        | CCEMC     |        |               |         |                  |
| Drawings                          | CCEM      | C      |               |         |                  |
| Estimates                         |           |        | ECMC          |         | C                |
| Forms (Shipping/Receiving, Gov't) |           | CMC    | E             | C       |                  |
| Handwritten Memos                 |           |        | CC            | EM      | C                |
| Handwritten Instructions          |           |        | C             | ECM     | C                |
| Installation Instructions         |           | CCM    | C             | E       |                  |
| Job Sheets                        |           |        | C             | EMCC    |                  |
| Manufacturer's Instructions       |           |        | CM            | EC      | C                |
| Operating Manuals                 |           |        | CMC           | E       | C                |
| Parts Numbers                     |           | E      |               | CM      | CC               |
| Planning (Schedules)              |           | EMC    |               | CC      |                  |
| Reference Manuals                 |           |        |               | CEMC    | C                |
| Tool/Equipment Instructions       | C         |        | MCC           |         | E                |
| Trade Magazines                   |           |        |               | CC      | CEM              |
| Technical Manuals                 |           |        |               | CCM     | CE               |
| Safety Warnings (Signs)           | E         | MCCC   |               |         |                  |
| Work Orders (Change Notices)      |           | CM     | EC            | C       |                  |
| Log Sheets                        |           |        |               | E       |                  |
| Schematics                        |           | E      |               |         |                  |
| Time Sheets                       |           |        |               | E       |                  |
| Permits                           |           |        |               |         |                  |

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MAILNME  
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APPPSTCDE

Dear Apprentice:

The Apprenticeship and Training Branch of Manitoba Labour has requested assistance of the University of Manitoba to research reading skills required for trades. A Master of Education student has agreed to use this as a thesis research topic.

A survey has been developed to gather this data, but it must be reviewed by individuals in the field. You have been identified by your respective apprenticeship counsellors as being a person who could and would provide the necessary information and evaluation of the enclosed questionnaire. In no way will you have to identify yourself, it is the information that is important, not your name. All replies will remain confidential.

You are being requested to take the time to not only complete the survey, but most importantly to provide feedback on the questionnaire. Please provide the following information:

- 1) the time it takes to complete the survey, for example 20 minutes;
- 2) any unclear wording;
- 3) any changes in information which should be included or left out; and,
- 4) any additional comments you may have.

You may return this information to the Apprenticeship and Training Branch in any one of three ways:

- a) by writing on the survey and mailing it back in the enclosed, stamped and addressed envelope;
- b) by calling Shirley Walker, (Apprenticeship Counsellor) at 945-4647; or
- c) by phoning Janis McKeag, (Master of Education student) at 489-5404.

As the information is needed as soon as possible, your quick completion of the survey and the necessary feedback would be greatly appreciated.

Thank you.

M. Kenny  
Director



## Appendix D

The following survey is designed to assess the reading tasks of construction apprentices during the on-the-job component of their apprenticeship training. All information provided will be treated confidentially.

### INSTRUCTIONS FOR PART A - BACKGROUND INFORMATION

Please check (✓) the appropriate information in each category

GENDER: MALE \_\_\_\_ FEMALE \_\_\_\_

AGE : 16-24 \_\_\_\_ ; 25-33 \_\_\_\_ ; 34-42 \_\_\_\_ ; 43-50 \_\_\_\_ ; 50+ \_\_\_\_

FIRST LANGUAGE ENGLISH \_\_\_\_ ; FRENCH \_\_\_\_ ; OTHER, please specify \_\_\_\_

| LEVEL                                 | TRADE | APPRENTICESHIP             |
|---------------------------------------|-------|----------------------------|
| CABINET MAKER                         |       | ____ ; 1__ 2__ 3__ 4__     |
| CARPENTER                             |       | ____ ; 1__ 2__ 3__ 4__     |
| CONSTRUCTION ELECTRICIAN              |       | ____ ; 1__ 2__ 3__ 4__     |
| POWER ELECTRICIAN                     |       | ____ ; 1__ 2__ 3__ 4__     |
| PLUMBER                               |       | ____ ; 1__ 2__ 3__ 4__     |
| STEAMFITTER                           |       | ____ ; 1__ 2__ 3__ 4__ 5__ |
| SPRINKLER & FIRE PROTECTION INSTALLER |       | ____ ; 1__ 2__ 3__ 4__ 5__ |

EDUCATION : GRADE 9\_\_\_\_; GRADE 10\_\_\_\_; GRADE 11\_\_\_\_; GRADE 12\_\_\_\_;  
COMMUNITY COLLEGE\_\_\_\_; POST SECONDARY\_\_\_\_;  
OTHER please specify: \_\_\_\_\_

### INSTRUCTIONS FOR PART B - READING TASKS

Carefully read each statement below. Place a check (✓) to indicate how many times you read each task during your on the job component of apprenticeship training.

Example:

How frequently do you read **blueprints** on the job?

Daily \_\_\_\_ 2-3 times a Week ☒ Weekly \_\_\_\_  
Once a Month \_\_\_\_ Not at all \_\_\_\_

1. How often do you read **directions** such as those given by your supervisor?  
 Daily \_\_\_\_\_ 2-3 times a Week \_\_\_\_\_ Weekly \_\_\_\_\_  
 Once a Month \_\_\_\_\_ Not at all \_\_\_\_\_
2. With what frequency do you read signs such as **safety warnings**?  
 Daily \_\_\_\_\_ 2-3 times a Week \_\_\_\_\_ Weekly \_\_\_\_\_  
 Once a Month \_\_\_\_\_ Not at all \_\_\_\_\_
3. How many times do you look at **drawings or schematics** ?  
 Daily \_\_\_\_\_ 2-3 times a Week \_\_\_\_\_ Weekly \_\_\_\_\_  
 Once a Month \_\_\_\_\_ Not at all \_\_\_\_\_
4. How frequently do you read **manufacturer's brochures or catalogues**?  
 Daily \_\_\_\_\_ 2-3 times a Week \_\_\_\_\_ Weekly \_\_\_\_\_  
 Once a Month \_\_\_\_\_ Not at all \_\_\_\_\_
5. How often do you refer to **tables, charts, or graphs in building code books**?  
 Daily \_\_\_\_\_ 2-3 times a Week \_\_\_\_\_ Weekly \_\_\_\_\_  
 Once a Month \_\_\_\_\_ Not at all \_\_\_\_\_
6. How frequently do you read **technical, reference, or operating manuals**?  
 Daily \_\_\_\_\_ 2-3 times a Week \_\_\_\_\_ Weekly \_\_\_\_\_  
 Once a Month \_\_\_\_\_ Not at all \_\_\_\_\_
7. How many times do you read **safety rules** ?  
 Daily \_\_\_\_\_ 2-3 times a Week \_\_\_\_\_ Weekly \_\_\_\_\_  
 Once a Month \_\_\_\_\_ Not at all \_\_\_\_\_
8. How many times do you read **handwritten memos or instructions** ?  
 Daily \_\_\_\_\_ 2-3 times a Week \_\_\_\_\_ Weekly \_\_\_\_\_  
 Once a Month \_\_\_\_\_ Not at all \_\_\_\_\_
9. How frequently do you read **forms** such as shipping/receiving forms or government forms ?  
 Daily \_\_\_\_\_ 2-3 times a Week \_\_\_\_\_ Weekly \_\_\_\_\_  
 Once a Month \_\_\_\_\_ Not at all \_\_\_\_\_
10. How often do you see **estimates** for the job you are on ?  
 Daily \_\_\_\_\_ 2-3 times a Week \_\_\_\_\_ Weekly \_\_\_\_\_  
 Once a Month \_\_\_\_\_ Not at all \_\_\_\_\_

11. How frequently do you read **blueprints** ?  
Daily \_\_\_\_\_ 2-3 times a Week \_\_\_\_\_ Weekly \_\_\_\_\_  
Once a Month \_\_\_\_\_ Not at all \_\_\_\_\_
12. How many times do you read **tool or equipment instructions**?  
Daily \_\_\_\_\_ 2-3 times a Week \_\_\_\_\_ Weekly \_\_\_\_\_  
Once a Month \_\_\_\_\_ Not at all \_\_\_\_\_
13. How frequently do you read **work orders** such as change notices?  
Daily \_\_\_\_\_ 2-3 times a Week \_\_\_\_\_ Weekly \_\_\_\_\_  
Once a Month \_\_\_\_\_ Not at all \_\_\_\_\_
14. How often do you read **diagrams** such as for installation of a part?  
Daily \_\_\_\_\_ 2-3 times a Week \_\_\_\_\_ Weekly \_\_\_\_\_  
Once a Month \_\_\_\_\_ Not at all \_\_\_\_\_
15. How often do you read plans such as **log sheets, schedules, or time sheets**?  
Daily \_\_\_\_\_ 2-3 times a Week \_\_\_\_\_ Weekly \_\_\_\_\_  
Once a Month \_\_\_\_\_ Not at all \_\_\_\_\_
16. How often do you read **trade magazines**?  
Daily \_\_\_\_\_ 2-3 times a Week \_\_\_\_\_ Weekly \_\_\_\_\_  
Once a Month \_\_\_\_\_ Not at all \_\_\_\_\_
17. How many times do you read **bills or invoices** ?  
Daily \_\_\_\_\_ 2-3 times a Week \_\_\_\_\_ Weekly \_\_\_\_\_  
Once a Month \_\_\_\_\_ Not at all \_\_\_\_\_
18. How frequently do you read **checklists**, for example material checklists?  
Daily \_\_\_\_\_ 2-3 times a Week \_\_\_\_\_ Weekly \_\_\_\_\_  
Once a Month \_\_\_\_\_ Not at all \_\_\_\_\_
19. How often do you read **installation or manufacturer's instructions**?  
Daily \_\_\_\_\_ 2-3 times a Week \_\_\_\_\_ Weekly \_\_\_\_\_  
Once a Month \_\_\_\_\_ Not at all \_\_\_\_\_
20. How many times do you read **parts numbers**?  
Daily \_\_\_\_\_ 2-3 times a Week \_\_\_\_\_ Weekly \_\_\_\_\_  
Once a Month \_\_\_\_\_ Not at all \_\_\_\_\_

## INSTRUCTIONS FOR PART C - IMPORTANCE OF READING TASKS

For each statement, circle the number which best reflects your opinion on the importance of reading for each task.

Example:

It is important to read **blueprints** carefully.

1 Strongly Agree ☒ 2 Agree 3 Undecided 4 Disagree 5 Strongly Disagree

1. Accurate reading of **time sheets, schedules or log sheets** is important.

1 Strongly Agree 2 Agree 3 Undecided 4 Disagree 5 Strongly Disagree

2. Sometimes it is alright to ignore **safety warnings** on job sites.

1 Strongly Agree 2 Agree 3 Undecided 4 Disagree 5 Strongly Disagree

3. Reading **drawings or schematics** correctly is an important part of my job.

1 Strongly Agree 2 Agree 3 Undecided 4 Disagree 5 Strongly Disagree

4. It is not important to read and follow **installation or manufacturer's instructions**.

1 Strongly Agree 2 Agree 3 Undecided 4 Disagree 5 Strongly Disagree

5. Making mistakes in reading **bills or invoices** is acceptable.

1 Strongly Agree 2 Agree 3 Undecided 4 Disagree 5 Strongly Disagree

6. It is important to read **blueprints** carefully.

1 Strongly Agree 2 Agree 3 Undecided 4 Disagree 5 Strongly Disagree

7. **Trade magazines** are not important reading materials

1 Strongly Agree 2 Agree 3 Undecided 4 Disagree 5 Strongly Disagree

8. **Parts numbers** must be read accurately.

1 Strongly Agree 2 Agree 3 Undecided 4 Disagree 5 Strongly Disagree

9. Careful reading of **tables, charts or graphs in building codes books** is essential.

1 Strongly Agree 2 Agree 3 Undecided 4 Disagree 5 Strongly Disagree

10. **Instructions for tools and equipment** must be read carefully.

1 Strongly Agree 2 Agree 3 Undecided 4 Disagree 5 Strongly Disagree

11. It is not important to read **construction regulations** on the job.

1 Strongly Agree 2 Agree 3 Undecided 4 Disagree 5 Strongly Disagree

12. Accurate reading of **forms** is not important.

1 Strongly Agree   2 Agree   3 Undecided   4 Disagree   5 Strongly Disagree

13. **Checklists** must be read carefully.

1 Strongly Agree   2 Agree   3 Undecided   4 Disagree   5 Strongly Disagree

14. It is important to read **work orders** accurately.

1 Strongly Agree   2 Agree   3 Undecided   4 Disagree   5 Strongly Disagree

15. **Diagrams** do not have to be read correctly.

1 Strongly Agree   2 Agree   3 Undecided   4 Disagree   5 Strongly Disagree

16. Careful reading of **estimates** is not important.

1 Strongly Agree   2 Agree   3 Undecided   4 Disagree   5 Strongly Disagree

17. **Manufacturer's brochures or catalogues** are not important reading materials.

1 Strongly Agree   2 Agree   3 Undecided   4 Disagree   5 Strongly Disagree

18. **Technical, reference or operating manuals** are important reading materials.

1 Strongly Agree   2 Agree   3 Undecided   4 Disagree   5 Strongly Disagree

19. Accurate reading of **directions** is important.

1 Strongly Agree   2 Agree   3 Undecided   4 Disagree   5 Strongly Disagree

20. Careful reading of **handwritten memos or instructions** is not critical.

1 Strongly Agree   2 Agree   3 Undecided   4 Disagree   5 Strongly Disagree

#### INSTRUCTIONS FOR PART D - ADDITIONAL COMMENTS

If you have any other information or reading tasks which you feel should be included, please add it the space provided below..

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09/14/90

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Dear Apprentice:

The Apprenticeship and Training Branch of Manitoba Labour has requested assistance of the University of Manitoba to research reading skills required for trades. A Masters of Education student has agreed to use this as a thesis research topic.

The enclosed survey has been designed to determine the on the job reading tasks of apprentices. It will also assess the frequency and the importance of each reading task. It is our belief that this information can be provided only by apprentices working in their chosen trade.

We would appreciate it if you would take the time to complete the questionnaire and return it in the enclosed self-addressed, stamped envelope by Month, Day, Year. We realize your time is valuable and you are under no obligation to participate in the study, but the information that you can provide will be very useful for determining the reading tasks of apprentices in construction trades.

All data collected in this study will be treated confidentially. Please be assured that you will be in no way identified in the report of the study.

Thank you in advance for your cooperation. Please feel free to contact Janis McKeag at 489-5404 or leave a message at The Apprenticeship Branch 945-3337. A summary of the major findings of this study will be available through the Apprenticeship and Training Branch or by contacting Janis directly at the above number.

Yours sincerely,

Marilyn Kenny  
Director



**Labour****Apprenticeship and Training**

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11/10/90

(204) 945-3337

MAILNME  
APPSTADD  
appmailadd  
APPPSTCDE

Dear Tradesperson:

Approximately two weeks ago, you were sent a package from the Apprenticeship and Training Branch, which you received by now. This package contained a questionnaire designed to assess the reading tasks of tradespeople in designated construction trades in Manitoba for a Master's of Education thesis project.

We realize this is a very busy time for individuals in your industry, and that you may not have had a few spare moments. We hope that over the next few days you will find the time to answer the questionnaire and return it in the self-addressed stamped envelope.

Once again thank you for your cooperation and participation. Please feel free to contact Janis McKeag at 489-5404 or 945-3337. A summary of the major findings of the study will be available through the Apprenticeship and Training Branch or by contacting Janis directly at the above number.

Yours sincerely,

Marilyn Kenny  
Director

Encl.



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