Carpentry Reading Strategies is one of five instructional guides in the Reading Strategies in Vocational Education Series. Developed to assist teachers working with students considered disadvantaged because of reading deficiency, the guide contains several strategies suitable for adaptation, specifically related to carpentry instruction. Each of six sections into which the guide is divided contains informational material and extensive examples and exercises. Section 1 concerns readability and gives procedures and guidelines for how many samples to collect and how to collect them. Section 2 briefly describes the Cloze procedure and its usefulness as a reading test and as a teaching technique for the theory of case grammar. The following four sections each present a set of important reading skills: Basic Vocabulary Skills, Paragraph Comprehension, SQ4R (Survey, Question, Read, Record, Recite, Review), and Recognizing and Recording Complex Information. Each skill is broken down into segments requiring no more than 5-10 minutes of class time every other day. Home work utilizes text assignments normally required. Following individual skill discussions is the part, Textbook Application, where each skill is applied to the course's own textbook. Each section ends with additional suggestions for teaching the new skills. (A time frame is provided for teaching the skills.) (YLB)
CARPENTRY
READING STRATEGIES

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Division of Occupational and Vocational Studies
The Pennsylvania State University

Pennsylvania Department of Education
Bureau of Vocational Education

1980
FORWARD

Education amendments in 1976 (P.L. 94-482) provide for special assistance to a wide variety of students with "special needs." The special needs of these students are derived from conditions of the students which are believed to inhibit success in vocational programs. Both handicapped and disadvantaged individuals are to be served by the legislative provisions.

Academically disadvantaged students are those individuals who, because of math, reading, or communication deficiencies, may not be able to succeed in vocational programs. Legislation has provided for research and development projects to address the needs of these individuals. The projects in progress have been designed to respond to that call for research and development.

This instructional guide was developed for the purpose of assisting Carpentry teachers in their work with students who are considered disadvantaged because of reading deficiency. It was developed as a result of vocational reading research at The Pennsylvania State University. The guide is intended to be presented at workshops in 1980 funded by the Pennsylvania Department of Education.

"Carpentry Reading Strategies" have been developed according to certain distinct characteristics of reading requirements in vocational education:
(1) Reading is a vocational skill, one that requires reading abilities that differ from those associated with general literacy.

(2) There is a difference between curricular literature (textbooks and other literature which must be read in the context of student status) and occupational literature (manufacturers instructions, codes, specifications, safety warnings, etc.).

(3) Occupational reading skills are appropriately addressed in the vocational curriculum.

(4) There are strategies available to vocational teachers which need little or no reading specialization.

(5) Available strategies reflect the unique qualities of vocational reading, address general vocational reading skill requirements, and are useful for helping students disadvantaged because of reading deficiencies.

This guide is NOT intended to be envisioned as the final word in reading strategies. It contains examples of several strategies believed to be useful for the vocational instructor seeking methods that are specifically related to carpentry instruction. The instructors are responsible for taking these examples and applying them to their occupational specialties. Not all of the methods will work for all carpentry teachers or their respective students. The methods were designed to be adapted, not rigidly adhered to.
Companion R & D projects at Penn State will provide useful complementary aids. An *Employability Skills Curriculum Guide* (Wircenski, McPherson, Feng, 1980) will soon be available. That guide addresses socialization, financial management, values clarification, job procurement, and communication skills. Four other occupational specialties (Cosmetology, Data Processing, Medical Assisting, and Radio and Television) will be the bases for reading strategy guides (Thornton, 1980). These guides will focus more specifically on the individual occupational areas utilizing a format similar to the Carpentry guide.

Field testing during 1980-81 school year is expected to result in additional refinements of the several reading strategies. Criticism and recommendations are invited by all who receive these materials. Correspondence should be addressed to:

Director
Reading Intervention Strategies Project
113 Rackley Building
The Pennsylvania State University
University Park, PA 16802

L. Jay Thornton
Project Director
1980
ACKNOWLEDGEMENTS

The Reading Strategies in Vocational Education Series, of which this book is one part, has resulted from research conducted by the Division of Occupational and Vocational Studies, The Pennsylvania State University and the Bureau of Vocational Education, Pennsylvania Department of Education. Many people, not expressly identified as part of the project, have served willingly in the dispatch of its objectives. Appreciation is especially expressed to Mr. Wayne Orubb, Consultant for Disadvantaged and Handicapped, Bureau of Vocational Education, Pennsylvania Department of Education, for his support and procedural advice.

Fifteen Area Vocational-Technical Schools in the Center Region of Pennsylvania participated in the development of the series. Scores of manufacturers, publishers, and employers provided literature and information. A listing of the schools, manufacturers, publishers, and employers follows. The project would have been impossible without their help.

Two research efforts provided considerable information toward the development of the series. The first, Basic Reading Skills and Vocational Education, was published by The National Center for Research In Vocational Education under the auspices of the Knowledge Transformation Project. That publication was supervised by Dr. Carol P. Kowle. The second, Review and Synthesis of Reading in Vocational
Education, was published by the Division of Occupational and Vocational Studies in conjunction with the Division of Education Administration Policy Studies and The Pennsylvania Department of Education. Both titles are available directly from their respective publishers.

Appreciation is expressed to Mrs. Laura Frye for her careful attention to the typing and proofreading of not only the final drafts of each title in the series, but all the preliminary work and intervening drafts required. The secretarial assistance of Rosann Moore, Peggy Kresovich and Sharon Brode in the typing of manuscripts is especially appreciated.
DISCLAIMER

The activity which is the subject of this report was supported in whole or in part by the U. S. Office of Education, Department of Health, Education, and Welfare. However, the opinions expressed herein do not necessarily reflect the position or policy of the U. S. Office of Education, and no official endorsement by the U. S. Office of Education should be inferred.
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# Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Forward</strong></td>
<td>iii</td>
</tr>
<tr>
<td><strong>Acknowledgements</strong></td>
<td>vii</td>
</tr>
<tr>
<td><strong>Disclaimer</strong></td>
<td>ix</td>
</tr>
<tr>
<td><strong>List of Participating Schools</strong></td>
<td>x</td>
</tr>
<tr>
<td><strong>List of Participating Manufacturers and Employers</strong></td>
<td>xi</td>
</tr>
<tr>
<td><strong>List of Participating Publishers</strong></td>
<td>xiii</td>
</tr>
<tr>
<td><strong>List of Figures</strong></td>
<td>xvii</td>
</tr>
<tr>
<td><strong>Section I. Readability</strong></td>
<td>1</td>
</tr>
<tr>
<td><strong>Readability Procedures</strong></td>
<td>4</td>
</tr>
<tr>
<td><strong>Exercise 1</strong></td>
<td>22</td>
</tr>
<tr>
<td><strong>Samples: How Selected and How Many</strong></td>
<td>26</td>
</tr>
<tr>
<td><strong>Exercise 2</strong></td>
<td>28</td>
</tr>
<tr>
<td><strong>Section II. Cloze Procedure</strong></td>
<td>31</td>
</tr>
<tr>
<td><strong>Student Reading Ability</strong></td>
<td>33</td>
</tr>
<tr>
<td><strong>Exercise 3</strong></td>
<td>68</td>
</tr>
<tr>
<td><strong>Case Grammar and the Cloze Procedures</strong></td>
<td>73</td>
</tr>
<tr>
<td><strong>Exercise 4</strong></td>
<td>75</td>
</tr>
<tr>
<td><strong>Section III. Basic Vocabulary Skills</strong></td>
<td>81</td>
</tr>
<tr>
<td><strong>Formal Definitions</strong></td>
<td>83</td>
</tr>
<tr>
<td><strong>Exercise 5</strong></td>
<td>84</td>
</tr>
<tr>
<td><strong>Synonyms</strong></td>
<td>85</td>
</tr>
<tr>
<td><strong>Exercise 6</strong></td>
<td>85</td>
</tr>
<tr>
<td><strong>Illustrations</strong></td>
<td>86</td>
</tr>
<tr>
<td><strong>Exercise 7</strong></td>
<td>88</td>
</tr>
<tr>
<td><strong>Exercise 8</strong></td>
<td>94</td>
</tr>
<tr>
<td><strong>Glossaries</strong></td>
<td>94</td>
</tr>
<tr>
<td><strong>Educated Guessing</strong></td>
<td>98</td>
</tr>
<tr>
<td><strong>Exercise 9</strong></td>
<td>99</td>
</tr>
<tr>
<td><strong>Exercise 10: Textbook Application</strong></td>
<td>100</td>
</tr>
<tr>
<td><strong>Teaching Students Vocabulary Skills</strong></td>
<td>102</td>
</tr>
</tbody>
</table>
### TABLE OF CONTENTS (Continued)

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IV. PARAGRAPH COMPREHENSION</strong></td>
<td>105</td>
</tr>
<tr>
<td>Paragraph Subject</td>
<td>108</td>
</tr>
<tr>
<td>Exercise 11</td>
<td>108</td>
</tr>
<tr>
<td>Paragraph Main Idea</td>
<td>109</td>
</tr>
<tr>
<td>Exercise 12</td>
<td>109</td>
</tr>
<tr>
<td>Paragraph Comprehension and Illustrations</td>
<td>113</td>
</tr>
<tr>
<td>Exercise 13</td>
<td>113</td>
</tr>
<tr>
<td>Exercise 14: Textbook Application</td>
<td>115</td>
</tr>
<tr>
<td>Teaching Students to Understand the Paragraph</td>
<td>117</td>
</tr>
<tr>
<td><strong>V. EFFECTIVE READING TECHNIQUE</strong></td>
<td>119</td>
</tr>
<tr>
<td>The SQ4R Method of Study</td>
<td>121</td>
</tr>
<tr>
<td>Exercise 15: Textbook Application</td>
<td>123</td>
</tr>
<tr>
<td>Teaching SQ4R</td>
<td>124</td>
</tr>
<tr>
<td><strong>VI. RECOGNIZING AND RECORDING COMPLEX INFORMATION</strong></td>
<td>127</td>
</tr>
<tr>
<td>Classification</td>
<td>129</td>
</tr>
<tr>
<td>Elements of a Drawing</td>
<td>130</td>
</tr>
<tr>
<td>Exercise 16</td>
<td>131</td>
</tr>
<tr>
<td>Comparison</td>
<td>131</td>
</tr>
<tr>
<td>Exercise 17</td>
<td>133</td>
</tr>
<tr>
<td>Cause and Effect</td>
<td>136</td>
</tr>
<tr>
<td>Exercise 18</td>
<td>138</td>
</tr>
<tr>
<td>Exercise 19: Textbook Application</td>
<td>140</td>
</tr>
<tr>
<td>Teaching Students to Recognize and Record Complex Information</td>
<td>141</td>
</tr>
<tr>
<td><strong>REFERENCE NOTES</strong></td>
<td>142</td>
</tr>
<tr>
<td><strong>REFERENCES.</strong></td>
<td>143</td>
</tr>
</tbody>
</table>
# LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure 1:</td>
<td>Sample Readability Graph</td>
<td>7</td>
</tr>
<tr>
<td>Figure 2:</td>
<td>Graph for Estimating Readability</td>
<td>9</td>
</tr>
<tr>
<td>Figure 3:</td>
<td>Flesh Readability Formula Procedure</td>
<td>13</td>
</tr>
<tr>
<td>Figure 4:</td>
<td>Flesh Readability Procedure Form</td>
<td>15</td>
</tr>
<tr>
<td>Figure 5:</td>
<td>Sample With Word Count Over Words</td>
<td>19</td>
</tr>
<tr>
<td>Figure 6:</td>
<td>Sample Text With Syllables Marked</td>
<td>21</td>
</tr>
<tr>
<td>Figure 7:</td>
<td>Sample Graphs of GRL - Frequencies:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3, 6, 10, 15 Samples</td>
<td>27</td>
</tr>
<tr>
<td>Figure 8:</td>
<td>Readability Record</td>
<td>29</td>
</tr>
<tr>
<td>Figure 9:</td>
<td>Bifold Installation Instructions Cloze Test</td>
<td>35</td>
</tr>
<tr>
<td>Figure 10:</td>
<td>Pneumatic Nailer Safety Cloze Test</td>
<td>41</td>
</tr>
<tr>
<td>Figure 11:</td>
<td>Reversing Hammer Drill Cloze Test</td>
<td>47</td>
</tr>
<tr>
<td>Figure 12:</td>
<td>Window Instructions Cloze Test</td>
<td>53</td>
</tr>
<tr>
<td>Figure 13:</td>
<td>LS Pinner Service Cloze Test</td>
<td>61</td>
</tr>
<tr>
<td>Figure 14:</td>
<td>Definition By Illustration</td>
<td>87</td>
</tr>
<tr>
<td>Figure 15:</td>
<td>Flush Ceiling Framing</td>
<td>89</td>
</tr>
<tr>
<td>Figure 16:</td>
<td>Coursing</td>
<td>91</td>
</tr>
<tr>
<td>Figure 17:</td>
<td>Adhesives</td>
<td>93</td>
</tr>
<tr>
<td>Figure 18a:</td>
<td>Electrical Symbols</td>
<td>95</td>
</tr>
<tr>
<td>Figure 18b:</td>
<td>House Plans</td>
<td>97</td>
</tr>
</tbody>
</table>
SECTION 1
READABILITY
In order to plan for intervening in situations of reading deficiency, several pieces of information are required. First, it must be known how urgent the need to read actually is; in the context of both curriculum and occupational requirements. This does not suggest that reading, in the general literacy sense, may not be important. Educators clearly recognize that reading ability is crucial if learning is to occur. What this first question addresses is an examination of objectives and their component tasks to ascertain how much reading is required to complete the tasks and, ultimately, the objectives of the course.

Although there has been no research to date to distinguish between curricular and occupational reading requirements (Reference Note 1) it is not difficult to visualize differences between textbook reading and, for example, manufacturers maintenance manuals. When Willis Wagner in his carpentry text (1973) directed students to "follow directions listed in manufacturer's manual" (regarding tools), it was intended that the student of carpentry read this literature. That directive identified two kinds of reading: that which is required to read the Wagner textbook (curricular) and that required to read the manufacturer's instructions (occupational). Previous research A. De. W. Smith, 1974; Thornton, 1977; Thornton, 1979; Thornton, 1980) suggests that there could be significant differences in the readability level of sections of textbooks dealing with specific tasks and the readability level of literature pertaining to the performance of those tasks.
It is a fact that reading literature peculiar to an occupational specialty at least implies that some form of reading is a vocational skill. Thus, the second bit of information must be collected. It must be known (or decided) if the teacher, the school, and the school district intend to address reading within the vocational curriculum or as prerequisite skill. If reading is to be dealt with in the vocational curriculum, then all students must receive some form of vocational reading instruction. If, however, reading skill is envisioned to be prerequisite then the thrust of reading in vocational settings would be toward dealing with deficiencies. The strategies, in the latter situation, would be individualized and delivered on a case by case basis.

The previous two pieces of procedural information are fairly general; the third and fourth are specific. The third deals with how difficult literature in a specific occupational curriculum is to read. What is the readability level? The fourth deals with how able students are in terms of reading ability. Can students read literature necessary to succeed in a vocational program? We shall deal with these issues separately.

**Readability Procedures**

Readability procedures are devices to estimate the grade reading level (GRL) of selected pieces of literature. In other words, a readability analysis determines the approximate GRL a person must possess in order to read the literature analyzed. Not the underlining of estimate and approximate. It must be cautioned
that, although these procedures have been validated by extensive research, they are not the sole determinants of readability. Muncrief (1975) discussed a variety of other considerations that are involved in readability assessments. For our purposes of matching literature assessment to student ability an index of readability is a useful measure.

There is a second caution needed about readability procedures. Preliminary results of current research (Reference Note 2) brings up serious questions about trying to find an average readability level of occupational literature. For example, what does it mean that the average (the word "mean" is normally substituted for the word "average") readability level of a textbook is ninth (9th) grade? Because the word average or mean is used, it can be assumed that some of the literature is higher than ninth and some of it lower. What the average does not tell us is the range of readability levels and the concentration (mode at any level) of readability level.

In order to make sense out of that argument, a little must be known of how readability assessments are done. When analyzing a textbook (or any other lengthy piece of literature) random samples are selected. These samples are analyzed and an average of all of their readability levels is calculated. That average is the mean readability level of the literature. We will get more explicit about how this is done in the next section.

To point out the problem with using the mean (average) some hypothetical samples have been graphed below. The graphs show the
curve which would result if the frequencies of grade level of samples were plotted on the graph. The vertical axis of the graphs represents the frequency that samples were found to be at a particular grade level. The horizontal axis represents the specific grade levels. (See Figure 1)

All of the preceding graphs are of books at the ninth grade readability level. But they all differ in the concentration (mode) of levels. The point here is simply that the mean or average can be a deceptive statistic. The analysis can still be useful, providing the results include the range and distribution of readability scores sampled.

Two readability procedures will be discussed: (1) Fry procedure (See Figure 2); and (2) Flesh procedure (See Figure 3).

A form for calculating has been included to simplify the Flesh Formula calculations. (See Figure 4)
Figure 1: Sample Readability Graph

- **Average and Most Cases**: Frequency distribution with a peak at grade level 9, indicating most cases are at or above the 9th grade level.
- **Most Cases Above 9th**:
  - Frequency distribution with a peak at grade level 9, indicating most cases are above the 9th grade level.
  - Slight variability within the 9th grade level.
- **Most Cases below 9th**:
  - Frequency distribution with a peak at grade level 9, indicating most cases are below the 9th grade level.
  - Slight variability within the 9th grade level.
- **Most Cases at Highest and Lowest Levels**:
  - Frequency distribution with peaks at grade levels 7 and 12, indicating most cases are at the highest and lowest levels.

Most cases at the 9th grade level show substantial variability.
Figure 2: GRAPH FOR ESTIMATING READABILITY
by Edward Fry, Rutgers University, New Jersey

Average number of sentences per 100 words

LONG SENTENCES

SHORT SENTENCES

Average number of syllables per 100 words

SHORT WORDS

LONG WORDS
Figure 2 (Continued)

Directions: Use a stratified random procedure, at least five percent for books, more for shorter materials. For example: If a book is 350 pages long, five percent equals 17.5. 350 ÷ 17.5 equals 20. Select a starting number, for example: 6. The first sample page is 6; then 26; then 46; then 66; etc. If one of the pages has no text proceed one page at a time forward until a page is found from which a sample can be taken.

From each of these pages select 100 word passages (alternate positions on page from which taken. For example: beginning, middle, ending). Plot the average number of syllables and average number of sentences per 100 words on the above graph.

This will give you the average readability of the book.

Example:

<table>
<thead>
<tr>
<th></th>
<th>Syllables</th>
<th>Sentences</th>
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</thead>
<tbody>
<tr>
<td>First 100 Words</td>
<td>124</td>
<td>6.6</td>
</tr>
<tr>
<td>Second 100 Words</td>
<td>141</td>
<td>5.5</td>
</tr>
<tr>
<td>Third 100 Words</td>
<td>158</td>
<td>6.3</td>
</tr>
<tr>
<td>Average</td>
<td>141</td>
<td>6.3</td>
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Then plot the syllables and sentences for each sample. This will illustrate the range of readability for the literature being analyzed.

(For further information and validity data; see April, 1968 Journal of Reading and March, 1969 Reading Teacher.)
Figure 3: FLESH READABILITY FORMULA PROCEDURE

There is one readability procedure that is easily used with the assistance of a simple calculator. The Rudolph Flesh (1949) Readability Formula involves a count of the syllables in the sample and words per sentence in conjunction with a mathematical formula. The result is a "Reading Ease Score" which translates into grade reading level:

I. 1. Count the words in the sample (100 words or more, if available).
   2. Count the number of sentences.
   3. Divide the total number of words by the total number of sentences.
   4. Multiply that total (average number of words in a sentence) by 1.015.

II. 1. Count the syllables in the sample.
    2. Multiply the number of syllables by 100.
    3. Divide that total by the number of words in the sample.
    4. Multiply that total by .846.

III. Add I and II.

IV. Subtract III from 206.835.
    That is the reading ease score. It translates accordingly:

<table>
<thead>
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<th>R.E.Score</th>
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</tr>
</thead>
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<tr>
<td>115-120</td>
<td>1</td>
</tr>
<tr>
<td>110-114</td>
<td>2</td>
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<td>105-109</td>
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<tr>
<td>100-104</td>
<td>4</td>
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<td>90-99</td>
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</tr>
</tbody>
</table>

<table>
<thead>
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<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>80-89</td>
<td>6</td>
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<tr>
<td>70-79</td>
<td>7</td>
</tr>
<tr>
<td>60-69</td>
<td>8.5</td>
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<tr>
<td>50-59</td>
<td>11</td>
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<tr>
<td>40-49</td>
<td>14.5</td>
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<td>30-29</td>
<td>College Grad.</td>
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Figure 4: Flesh Readability Procedure Form

<table>
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<tr>
<th>Textbook</th>
<th>Publisher</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>Y</td>
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</table>

Pg.# #Wds. ÷ #Sent x 1.015  #Syl x 100 ÷ #Wds. x .846
Figure 4 (Continued)

<table>
<thead>
<tr>
<th>Minus (x + y)</th>
<th>R.E. Score</th>
<th>Grade</th>
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<tbody>
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<td>115-120</td>
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<td>105-109</td>
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<td>100-104</td>
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</tr>
<tr>
<td>206.835</td>
<td>0-29</td>
<td>College Grad.</td>
</tr>
</tbody>
</table>

R.E. Score
The textbook sample in Figure 5 demonstrates the rules

Instructions for Calculations

WORD COUNT - Fry: Count all words up to 100 words (may end in partial sentence.) Flesh: Count all words up to approximately 100 (end on full sentence).

Numbers - such as 30, 1951, 27-A, L78G are each counted as one word.

Hyphenated words - one word.

Abbreviations - one word.

Acronyms - such as PVA, NSU, USA, AVA are each counted as one word.

SENTENCES - Fry: Count the sentences and determine the tenth of a sentence when ending in a partial sentence. Flesh: Count all sentences.

Parenthetical expression - (enclosed in brackets) is one sentence even if contained in another sentence.

Semi-colon or colon - If there is a semi-colon or colon in what we usually consider a sentence, that is considered to be another sentence. The easiest way to handle that is to count one sentence overall and add one sentence - count for each colon or semi-colon in the sentence.

RECORDING - Fry: Write down the number of sentences per 100 words. In the example the 100th word is "can." There are 6 full sentences, plus the partial sentence ending in "can." There are 15 words up to and including "can" and 20 words in the sentence. Divide 15 by 20 (15 ÷ 20). That result is approximately .75 and
Figure 5: Sample With Word Count Over Words

Using A Dado Head

The dado head can be used to cut dados, grooves, lap joints, rabbets, and interlocking joints. The stock can be held and controlled with the fence or miter gauge, used separately or in combination.

To cut a groove, raise the dado head to the correct height and adjust the fence. Feed the stock through the machine as shown in Fig. 12-33.

Since you are removing a large amount of waste, feed the work slower than when using a regular saw blade. If the groove does not continue all the way along the piece, a stop can be preset on the fence.

(Wagner, W., 1978, p. 177)
rounds to 0.8. Therefore, for the Fry sentence count there are 6.8 sentences per 100 words. 

**Flesh:** Count to the end of the sentence in which the 100th word occurs. Therefore, there are 105 words and seven sentences. Enter these figures on the form and complete the math involved.

**SYLLABLES** - Syllables are counted in the same way for each procedure. An easy way is to count only those syllables over 1 for each word. For example:

1. The da/do head can be used to cut da/dos, grooves, lap
2. joints, rab/bets, and in/ter/lock/ing joints.

Complete the counting for the entire passage in the same manner. Your total then is added to the total number of words (100 for Fry; 105 for Flesh, in this example). That gives you the total syllable count.

**RECORDING - Fry:** Write down the total number of syllables. On the graph plot the total syllables (across) to the number of sentences per 100 words. That will give you the approximate readability level of that passage. 

**Flesh:** Write down the number of syllables in the space on the form and complete the mark as noted. Then add x and y and subtract that figure from 206.835. That is the Reading Ease score and translates to grade level on the chart.

The total sample syllable count and results for Flesh and Fry methods follow in Figure 6.
FIGURE 6: SAMPLE TEXT WITH SYLLABLES MARKED

THE DA/DO HEAD CAN BE USED TO CUT DA/DOS, GROOVES, LAP JOINTS, IN/TER/BETS, AND IN/TER/LOCK/ING JOINTS. THE STOCK CAN BE HELD AND CON/TROLLED WITH THE FENCE OR MI/TER GAUGE, USED SE/PAR/ATE/LY OR IN COM/BI/NA/TION.


Note that for numbers and acronyms, each letter (number) counts as a syllable.

(WAGNER, W., 1978, p. 177)
The following results were obtained from readability analyses of the preceding sample:

**Fry:**
- 100 words
- 6.8 sentences
- 131 syllables
- 6th grade

**Flesh:**
- 105 words
- 7 sentences
- 137 syllables
- R.E. Score 86.06
- 6th grade

**Exercise 1**

Following are three examples selected from other sections of the same textbook. Practice the procedure, marking syllables and sentence count directly on the samples.
Exercise 1 Sample 1

**Single-End Tenoners**

The standard design of a single-end tenoner consists of two tenoning heads, two coping heads, a cut-off saw and a movable carriage, Fig. 14-40.

In operation, the stock is clamped or held to the carriage and moved forward through the tenoning heads which make the cheek and shoulder cuts. It then passes by the coping heads which are mounted on vertical arbors and form contours on the shoulders if it is necessary for them to fit over molded edges. Finally the stock moves by the cut-off saw where the tenon is cut to length.

The cutting heads are powered by individual motors and can be adjusted to various vertical and horizontal positions. (Wagner, W., 1978, pp. 228-229)
Using the Router

The router motor revolves in a clockwise direction (when viewed from above) and therefore should be fed from left to right when making a cut along an edge facing you. When cutting around the outside of oblong or circular pieces, always move the machine in a counter-clockwise direction.

The rate of feed will vary with the hardness of the wood and size of cut. Routers have an induction motor which will slow down somewhat under load. Excessive loss of speed indicates too heavy a cut. When the work is heavy, it is best to reduce the depth of the cut and maintain a good rate of feed. (Wagner, W., 1978, p. 254)
EXERCISE 1  SAMPLE 3

USING DISK SANDER

The disk sander is used mainly for edge sanding. Hold the work firmly on the table and move it lightly against the disk. Use only the half of the disk that revolves downward past the table. Move the work along this surface and do not hold it at one place or excessive heat will be generated, causing the abrasive to load with gum and pitch. This will shorten the life of the abrasive and also cause burn marks on your work.

Pieces of irregular shapes are usually guided freehand. For accurate work on straight edges, use a miter gauge in the table slot as shown in Fig. 17-4. Other types of guides and auxiliary tables can be used for special work. (Wagner, W., 1978, p. 270)
SAMPLES: HOW SELECTED AND HOW MANY

It is important, if an accurate picture of the literature is to be obtained, that the samples to be analyzed be selected at random. Too many subjective errors would be introduced by merely paging through the book, picking what appears to be representative samples. The easiest way and one that is sufficiently random is entitled a stratified random sampling.

In order to achieve the stratified random sample, it must first be decided how many samples are to be drawn. A useful rule is to select samples from 5% of the pages in the book. Remember, however, that the more samples drawn, the more accurate will be the analysis. That point is demonstrated in the following analyses (See Figure 7) of a textbook under consideration in which 3, 6, 10, 15 were drawn. (Average was used in this case to distinguish between results of analyses in which increasing numbers of samples were drawn.)

It is recommended that 5% sample or more be drawn for accuracy.

Procedure: Assume a book has 300 pages (not including glossary or index). A 5% sample requires (.05 x 300) 15 samples. To establish the starting page divide the total pages (300) by the total samples required (15). That result is 20. Randomly pick a number from 1-20. This can be done using numbers in a hat. That number is the starting page. Let's assume it is 6. The remainder
Figure 7: Sample Graphs of GRL Frequencies: 3, 6, 10, 15 Samples

<table>
<thead>
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<th>Grade Level</th>
<th>Frequency</th>
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<tbody>
<tr>
<td>3 Samples</td>
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<tr>
<td>9</td>
<td>1</td>
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<td>11</td>
<td>1</td>
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<tr>
<td>12</td>
<td>1</td>
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<table>
<thead>
<tr>
<th>Grade Level</th>
<th>Frequency</th>
</tr>
</thead>
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<tr>
<td>6 Samples</td>
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<td>8</td>
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<td>2</td>
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<td>11</td>
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</table>

Mean 10.5

<table>
<thead>
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<tbody>
<tr>
<td>10 Samples</td>
<td></td>
</tr>
<tr>
<td>8</td>
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</tr>
<tr>
<td>9</td>
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</tr>
<tr>
<td>12</td>
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</tr>
<tr>
<td>13</td>
<td>3</td>
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Mean 11.0

<table>
<thead>
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</thead>
<tbody>
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<td>12</td>
<td>2</td>
</tr>
<tr>
<td>13</td>
<td>5</td>
</tr>
</tbody>
</table>

Mean 10.9
Now we know the pages of the book we will use in the analysis. If any of those pages contains no text (some may be pictures or diagrams) move one page at a time forward or backward until text is found. It is also recommended that the sample 100 words be selected alternatively from the beginning (B) and end (E) of the page. Therefore, page 6 would be 6-B (for beginning), page 26-E (for end), page 46-B, etc.

Exercise 2

Compute a stratified random sample schedule for the following:
1. Textbook with 350 pages.
2. Textbook with 1000 pages.
3. Textbook with 525 pages.

If the literature you plan to analyze contains less than 200 pages, but more than 25, select 10 samples. For literature of less than 25 pages, but more than 5, select every other page. For literature less than 5 pages, take a sample of every page.

On the following page (See Figure 8) is a form to assist you in recording your findings. It is always a good idea to keep a file of literature analyzed.
Figure 8: Readability Record

Author(s):
Title of Literature:
Publisher:
Publication Data:
  Total Number of pages:
  Percent of pages sampled:
  Procedure used:
Page numbers from which samples were taken:

Highest readability:

Lowest readability:

Graph for Plotting Results
SECTION 2
CLOZE PROCEDURE
STUDENT READING ABILITY

Diagnostic reading test scores are often available for students in vocational programs. These scores, normally on file at the home school (in the counselor's office at the comprehensive high school), are useful indicators of a student's general reading ability. How well they relate to vocational reading requirements is subject to conjecture. There simply has not been a concerted effort to separate vocational reading skill from general literacy skill. Because of these unknowns it is strongly recommended that you not accept a GRL score as final. Standardized reading test scores are useful indicators, but they should be supplemented with teacher-made vocational reading tests.

A useful and highly adaptable reading test is the cloze procedure:

The cloze procedure is an objective measure of language correspondence between reader and writer. It consists of a cloze (word) unit, a single occurrence of a successful attempt to reproduce accurately a part deleted from a message, by deciding from the context that remains what the missing part should be (Taylor, 1953).

The cloze procedure differs from vocabulary contextual texts. Rather than choosing omitted words because of definition and purpose, the cloze units are chosen mechanically; every fifth word, for example, occurring at any point in a continuous passage is omitted. The cloze design incorporates control against misrepresenting strength/weakness in content vocabulary as an indication of the test subject's ability/ inability to read (Thornton, 1979).

Any piece of literature can be clozed. That includes textbooks, occupational literature, safety messages, codes, medical contraindications, literally anything. The procedure is described below:
1. Select a piece of literature.
2. Leave the first sentence intact.
3. Delete every fifth word.
4. Leave the last sentence intact.
5. Instruct the student to read the entire passage first, then begin filling in the blanks.
6. Instruct the student to be aware when guessing is the rationale for word selection, but to guess when other rationale fails.

Scoring the test is accomplished as follows:

0-39.9% Frustrational level (Student will not be able to read the literature)
40.0-69.9% Instructional level (Student will require intervention to be able to read the literature)
70.0-100.0% Independent level (Student is able to read the literature without intervention)

On the following pages five different cloze tests have been prepared using on-the-job literature. The correct words which have been deleted are listed following each example.
Figure 9: Bifold Installation Instructions

Installing:

1. Verify the finished opening size by measuring as illustrated. The opening ________ should correspond with 1/8" ________ the nominal size description ________ your bifold unit. The ________ and hardware are sized ________ fit the opening providing ________ tolerance for smooth operation. ________ finished opening heights must ________ 80-1/2" for 6'8" units; ________ for 6'6" units and ________ for 8' units.

2. ________ the overhead track 1-3/8" ________

   the front of the ________ jamb with screws provided; ________ the moulding (fascia strip) ________ front of it. 1-1/2" ________

   nails are recommended. On ________ units make certain track ________ turned so that the ________ pivot bushing is to ________

   right for right-hand operation ________ from the living area.)
Figure 9 (Continued)

1. **Install the jamb bracket** #256) using the placement printed on reverse side this sheet to mark drill screw holes.

4. Installing doors check bottom for approximate setting. Three threads should be exposed the plastic and the hex shoulder.

5. Install doors that are hinged by inserting the top into the plastic track and the guide into the track. Lift to compress the springs. Now the bottom pivot may be brought over the jamb bracket and lowered into place.

Bifold Installation Instruction, Amarillo, Texas: Maywood, Inc. (No date)
<table>
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<tr>
<th>Size</th>
<th>Nail</th>
<th>Or</th>
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<tbody>
<tr>
<td>To</td>
<td>In</td>
<td>Before</td>
</tr>
<tr>
<td>Of</td>
<td>Finishing</td>
<td>Pivots</td>
</tr>
<tr>
<td>Doors</td>
<td>2-door</td>
<td>Full</td>
</tr>
<tr>
<td>To</td>
<td>Is</td>
<td>Between</td>
</tr>
<tr>
<td>Proper</td>
<td>Plastic</td>
<td>Metal</td>
</tr>
<tr>
<td>The</td>
<td>The</td>
<td>Two</td>
</tr>
<tr>
<td>Be</td>
<td>(viewed)</td>
<td>Together</td>
</tr>
<tr>
<td>78-1/2”</td>
<td>3.</td>
<td>Pivot</td>
</tr>
<tr>
<td>96”</td>
<td>(part)</td>
<td>Bushing</td>
</tr>
<tr>
<td>Install</td>
<td>Guide</td>
<td>Wheel</td>
</tr>
<tr>
<td>From</td>
<td>Of</td>
<td>Up</td>
</tr>
<tr>
<td>Head</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
FIGURE 10: PNEUMATIC NAILER SAFETY CLOZE TEST

WARNING:
Operators must wear safety glasses or goggles when operating the tool.

When the air supply ______ connected keep your hands ______ body away from the ______ discharge area. Do not ______ the tool without nailing ______ material.

Operating pressure must ______ exceed 100 PSIG, (6.8 ______).

Do not connect female ______ coupler direct to tool. ______ male free flow nipple ______ tool, and female quick ______ to air hose. If ______ improperly and disconnected from ______ supply tool will remain ______ with air, will not ______ exhaust and will fire ______ nail if trigger mechanism ______ actuated.

Always disconnect the ______ supply before
MAKING ADJUSTMENTS _______ SERVICING THE TOOL.

CHECK _______ TO BE CERTAIN THE _______ TRIP MECHANISM IS WORKING _______.

Pusher spring (constant force _______), caution must be used _______ working with the spring _______ outside the tool. The _______ is wrapped around, but _______ attached to, a roller. _______ the spring is extended _______ its length, the end _______ come off the roller _______ the spring will roll _______ with a snap, with _______ chance of pinching your _______. Also the edges of _______ extended spring are very _______ and could cut.

Do _______ use oxygen or combustible _______ as a power source _______ this tool.

Failure to observe any of these warnings may result in injury.

**Figure 10 (continued)**

<table>
<thead>
<tr>
<th>IS</th>
<th>Charged</th>
<th>Not</th>
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<tbody>
<tr>
<td>AND</td>
<td>Freely</td>
<td>If</td>
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<tr>
<td>Fastener</td>
<td>A</td>
<td>Beyond</td>
</tr>
<tr>
<td>Fire</td>
<td>Is</td>
<td>Will</td>
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<tr>
<td>Into</td>
<td>Air</td>
<td>And</td>
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<td>Not</td>
<td>Or</td>
<td>Up</td>
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<tr>
<td>Atmospheres)</td>
<td>Regularly</td>
<td>The</td>
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<td>Quick Attach</td>
<td>Contact</td>
<td>Hand</td>
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<tr>
<td>To</td>
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<td>The</td>
</tr>
<tr>
<td>Thin</td>
<td>Spring</td>
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</tr>
<tr>
<td>Coupler</td>
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<td>Not</td>
</tr>
<tr>
<td>Connected Assembly</td>
<td>Gases</td>
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<tr>
<td>Air</td>
<td>Spring</td>
<td>For</td>
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</tbody>
</table>
FIGURE 11: REVERSING HAMMER DRILL CLOZE TEST

SWITCH

THE VARIABLE SPEED TRIGGER SWITCH PERMITS A WIDE RANGE OF SPEED CONTROL - THE FARThER THE TRIGGER IS DEPRESSED, THE HIGHER THE SPEED OF THE DRILL. A SWITCH LOCKING BUTTON __________ LOCKING THE TRIGGER IN ________ FULL "ON" POSITION FOR ________ OPERATION. TO LOCK THE ________ "ON" DEPRESS TRIGGER FULLY ________ PUSH UP LOCKING BUTTON ________, THEN GENTLY RELEASE TRIGGER. ________ RELEASE LOCKING MECHANISM, DEPRESS ________ FULLY, THEN RELEASE IT. ________ NOT LOCK TRIGGER "ON" ________ HAND-HELD DRILLING, SO THAT ________ CAN RELEASE TRIGGER INSTANTLY ________ BIT BINDS IN HOLE. ________ SURE TO RELEASE THE ________ LOCKING BUTTON BEFORE DISCONNECTING ________ PLUG FROM THE POWER ________. FAILURE TO DO SO ________ CAUSE THE TOOL TO ________ IMMEDIATELY THE NEXT TIME ________ IS PLUGGED IN. DAMAGE ________ INJURY COULD RESULT.
NOTE: _______ LOWER SPEEDS FOR STARTING _______ WITHOUT A CENTER PUNCH. _______ IN METAL OR PLASTICS, _______ CERAMICS, OR MIXING PAINT. _______ SPEEDS ARE BETTER FOR _______ WOODS AND COMPOSITION BOARDS, _______ FOR USING ABRASIVE AND _______ ACCESSORIES.

REVERSING SWITCH: For _______ SCREWS OR EASING DRILL _______ OUT OF TIGHT HOLES, _______ THE REVERSING SWITCH, TOWARD _______ TO REVERSE THE DRILL _______. THE TRIGGER SWITCH SHOULD _______ RELEASED TO THE “OFF” _______ BEFORE MOVING THE REVERSING _______. AFTER ANY REVERSING OPERATIONS, RETURN SWITCH TO THE FORWARD, “F” POSITION.

(OWNERS MANUAL: 3/8” VARIABLE SPEED REVERSING HAMMER DRILL, TOWSON, MARYLAND: THE BLACK & DECKER MFG. CO., 1979)
Figure 11 (Continued)

Permits be higher drilling and polishing removing bits.
The switch will supply polishing and removing bits.
Continuous drilling.
Trigger will remove bits.
And "A" start it.
"A" start it.
And will supply polishing and removing bits.
"A" start it.
Trigger will supply polishing and removing bits.
To slide "R".
To slide "R".
Do use "R".
Do use "R".
For holes motor be.
For holes motor be.
You drilling position.
You drilling position.
If drilling switch.
If drilling switch.
FIGURE 12: WINDOW INSTRUCTIONS CLOZE TEST

CODES:
SELECTION OF ANDERSEN PRODUCTS WHICH CONFORM TO ALL APPLICABLE LAWS, ORDINANCES, BUILDING CODES AND SAFETY REQUIREMENTS IS THE SOLE RESPONSIBILITY OF THE ARCHITECT, BUILDING OWNER AND/OR CONTRACTOR AND ANDERSEN CORPORATION HAS NO RESPONSIBILITY IN THIS REGARD. CHECK WITH YOUR _______ ANDERSEN DEALER AND BUILDING _______ OFFICIALS FOR SPECIFIC INFORMATION.

_______ GLASS:
UNLESS SPECIFICALLY ORDERED, _______ WINDOWS ARE NOT PROVIDED _______ SAFETY GLASS, AND IF _______, THE GLASS COULD FRAGMENT _______ INJURY. MANY LAWS AND _______ CODES REQUIRE SAFETY GLASS _______ LOCATIONS ADJACENT TO _______ NEAR DOORS. ANDERSEN WINDOWS _______ AVAILABLE IN SAFETY GLASS _______ MAY REDUCE THE LIKELIHOOD _______ INJURY WHEN BROKEN. INFORMATION _______ SAFETY GLASS IS AVAILABLE _______ YOUR LOCAL ANDERSEN SUPPLIER.
PERMA-SHIELD:
PERMA-SHIELD products in _______ color may be
painted _______ a quality oil base _______.
Latex paint. Creosote base _______ should not
come in _______ with Perma-Shield. Do not
_______ weatherstripping. Abrasive cleaners or
_______ containing corrosive solvents should
_______ be used on Perma-Shield _______.

Painting or staining may _______ damage to white
vinyl. _______ additional information, write
to _______ Corporation.

Prefinished:
ANDERSEN _______ wood gliding door in _______.
Color and prefinished basement _______ in white
may be _______ with a quality oil _______.

For additional information _______ painting,
write to Andersen _______.
FIGURE 12 (CONTINUED)

PRIMED WOOD:
FACTORY PRIMED __________ PRODUCTS SHOULD BE FINISH _________ AS SOON AS POSSIBLE. _________
SIX MONTHS UNITS SHOULD ________ PRIMED AGAIN BEFORE FINISH _________ ARE APPLIED.

BEFORE INSTALLING, _________ THE EDGES OF GLAZING _________; LAPPIN^ PAINT SLIGHTLY ONTO _________ GLASS, TO PROVIDE ADDITIONAL _________.

OR PROTECT INSIDE SURFACES OF SASH AS SOON AS POSSIBLE.

(DETAIL CATALOGUE NO. 802, ANDERSEN WINDOWS - GLIDING DOORS. BAYPORT, MINNESOTA: ANDERSEN CORPORATION, 1980, P. 44)
Local Painting Unit
Code Terratone Painted
Safety With Base
Andersen Or On
With Stains Corporation
Broken Contact Andersen
Painting Painted
Building Solutions After
In Not Be
Or Products Coats
Are Cause Prime
Which For Compound
Which Of Exterior
Of Prefinished Protection
On From Terratone
FIGURE 13: LS PINNER SERVICE CLOZE TEST

AIR PRESSURE

The recommended operating pressure range for the power source of the LS PIN TACKERS is 70 to 100 P.S.I.G. of clean, dry, compressed air.

Air ________ requirements vary with the ________ in which the LS ________ TACKERS are utilized. Failure ________ regulate the air pressure can ________ in the fastener being ________ driven. Use only the ________ pressure required to perform ________ application and no more. ________ air pressure can result ________ early failure of the ________ parts in the LS ________ TACKERS.

DANGER OF OXYGEN

__________ will react with the ________ and oil used in ________ Senco tool. This can ________ in an explosive condition ________ is extremely hazardous.
DANGER OTHER BOTTLED GASES

It possible for a hazardous to exist when using gases as a power. The hazardous condition is pressure which can exceed limits prescribed for the. Therefore, only clean, dry, compressed air must be as a power source.

THE LS PIN TACKERS be kept well lubricated consistent performance. They should oiled daily by either two drops of oil the air inlet at back of the tool using an oiler on air line. Detergent oil not be used or to the rubber components the tool will result.
FIGURE 13 (CONTINUED)

USE ONLY 10-WEIGHT NON-DETERGENT OIL IN THE PIN TACKERS.
<table>
<thead>
<tr>
<th>Pressure Application A</th>
<th>Grease Result Which</th>
<th>Used Lubrication Should</th>
</tr>
</thead>
</table>
| Pin To Result Of Improperly Placing | Is Condition In Air The Bottled Source The Excessive Or Excessive The Component Must Tool Damage In Oxygen Regulated In
Exercise 3

Cloze the following passage and write out the instructions to the students regarding how they should proceed.

General Information - Lap and Panel Sidings

Nailing: Use only galvanized nails. Box headed nails with xered heads are preferred with textured sidings. For best results on prestained and prepainted sidings, use 8d Masonite Brand Color Matched Nails available from local dealers.

Cutting: Use a fine-toothed hand saw or a power saw with a combination blade. Insure that the cutting action is toward, or into, the finished side.

Vapor Barriers: A properly installed continuous vapor barrier (1 perm or less rating) such as polyethylene film or foil backed gypsum board, is required on the warm (interior) side of the exterior walls in all buildings. This will preclude damaging condensation from occurring within the walls.

Foam Sheathing: Masonite brand siding products may be applied over foam plastic sheathing. The following special application and construction techniques are recommended:

1. Adequate bracing of the wall is required.
2. Nail lengths must be increased to compensate for the greater thickness of this sheathing. 3/4" Foam - Lap Siding 10d nail, Panel siding 8d nail, 1" Foam - Lap
Siding 12d nail, Panel Siding 10d nail. Care must be used to avoid crushing of the sheathing during nailing.

3. It is very important to use a continuous unbroken vapor barrier on the interior face of the walls, such a 6 mil polyethylene film, to reduce the possibility of moisture accumulation inside the wall cavities. In some cases it may be necessary to vent these cavities to the outside when foam plastic sheathing is used.

Masonite Corporation will assume no responsibility for problems related to moisture accumulation within the walls or to crushing of the foam plastic sheathing during or after application of the siding. (X-90 Siding Application, 1980, p. 16)

Exercise 3: Answer Sheet

Instructions:
The cloze procedure can also be used as a teaching technique. A variety of cloze modifications are useful for vocational teachers.

The changes in the procedure reflect the purpose of the exercise. If, for example, an occupational instructor wishes to highlight safe practices in a shop and be certain that the student reading safety literature understands what is being read, the passage can be "clozed," deleting those words which are critical to the safe practices comprehension. The following spray painting passage with "instructional modification" words (to be deleted) underlined illustrates the technique:
SAMPLE: INSTRUCTIONAL MODIFICATION CLOZE

Electrostatic spraying with a hand-held gun requires extra care. The gun, the piece to be sprayed, and all conductive equipment must be grounded to prevent sparking. While you are spraying, the gun must be held twice the sparking distance or at least 12 inches from the work and other conductive surfaces.

All electrical equipment must be in another room or well away from the spraying area (at least 20 feet) or it must be of the type approved for hazardous locations and explosive areas. (HEW Publication, NIOSH 76-173, p. 8)

Another modified cloze teaching technique is the "lexical cloze." Lexical is defined as relating to words of a language. The lexical cloze involved deletion of words according to the kinds of words they are, such as nouns, verbs, adjectives, etc. A later segment of this article develops case grammar modifications utilizing the lexical cloze, establishing applicability for occupational education reading intervention. The example which follows illustrates use of verb deletions in a carpentry application. The words to be deleted have been underlined:

GUMMING

Repeated filing is bound to make the teeth shallow and grinding them deeper with a grinding wheel is known as gumming. A saw does not need to be gummed every time it is rounded and set and filed.

When gumming by hand, to insure that you will gum all the teeth the same depth so the saw will be in balance, it is an easy matter to make a simple wooden compass with a round piece of wood to fit the center-hole of the saw. Drill a hole to hold a blue pencil...
and describe a circle the proper distance below the teeth. Then gum until the bottom of all the gullets just touch the edge of the circle.

When gumming with a grinding wheel, the operation should be performed by going around the saw several times. Do not crowd the wheel and take too deep a cut. Doing too much work at one time will heat the gullets and stretch the rim so that the saw will need hammering to restore the original tension. Crowding the wheel as to blue and burn the gullets is sure to injure the saw, often glazing it so hard that a file will make no impression on it. From these hard spots small cracks begin, invisible at first to the eye, but gradually enlarging until they become dangerous fractures.

(Gumming, Care and Use of Circular Saws, Fitchburg, MA: Simonds Cutting Tools, Wallace Murray Corporation, 1979, p. 14)

Note that only the verbs involving an action on part of the student have been marked for deletion. It is the activity that is emphasized in this reading intervention exercise.

When used as a teaching technique, the cloze procedure is easily adapted to provide for increasing degree of difficulty. Often vocational students have experienced a history of failures in reading. The pattern is conducive to diminished motivation in an attempt to read. In order to break the pattern and increase the likelihood of a motivated reader, a pattern of reading successes is useful. Literature of any level of readability can be clozed. Thus, vocational literature at a low readability level can be used for those students who need a success stimulus. In addition, for teaching purposes, synonymous or words close to the correct word can be accepted. The number of clozed words can be decreased, instead of following a schedule. The next example illustrates this point:
SOLID VINYL SOFFIT AND FASCIA SYSTEMS

1. The Bird soffit system utilizes a Quarter-Round Molding accessory—solid or perforated ventilating panels—and either an "F" Channel or a ½ inch "3" Channel.

2. In every case, the object is to provide two parallel slots—one on the house and the opposite side at the fascia—to allow for the insertion of soffit panels.

3. Either the Quarter-Round Molding or the "F" Channel may be used to provide a channel support at the wall. When the soffit area is open, the "F" Channel can be nailed directly to the wall. The Quarter-Round Molding will require a nailing support.

4. Where the soffit area is closed the Quarter-Round Molding can be nailed to the wooden soffit provided that it is level with the "F" Channel on the bottom of the fascia.

5. The "F" Channel is installed on the outer bottom edge of the fascia board to provide support for the outer edge of the panel.

6. The soffit panel is then cut to length. When you measure between channels, be sure to subtract one quarter inch for expansion.

(Solid Vinyl Soffit . . ., 1978).

For the word "slots," the student would be correct inserting "holes," for example. Note that only six deletions have been made and all are heavily clued.

CASE GRAMMAR AND THE CLOZE PROCEDURE

Gibson and Levin (1979) describe Fillmore's theory of case grammar. "... which imaginatively combines syntactic and semantic features." The study of meanings (semantics) and the orderly system of words (syntax) combine in Fillmore's Case Concepts (Brown, 1973). The theory of case grammar is easily adapted to teaching techniques.
using the cloze procedure. The following illustrations are from Wagner's *Modern Carpentry* (1979).

**Agentive (A)** - "The typically animate, perceived instigator of action."

Some applicators of asphalt shingles prefer to use a woven or closed-cut valley design, especially on re-roofing work (p. 190).

**Instrumental (I)** - "The inanimate force or object casually involved in the state or action named by the verb."

In modern construction, pneumatic powered staplers are often used to install asphalt shingles (p. 192).

**Dative (D)** - "The animate being affected by the state or action named by the verb."

Carpenters may be injured by improper lifting or carrying of heavy objects.

**Factive (F)** - "The object or being resulting from the state or action named by the verb."

Too wide a kerf can result from saw blade chatter.

**Locative (L)** - "The location or spatial orientation of the state or action named by the verb."

The (radial) arm is attached to a vertical column at the back of the table (p. 38).

**Objective (O)** - "The semantically most neutral case: anything representable by an noun whose role in the state or action named by the verb depends on the meaning of the verb itself."

Routing are used to cut irregular shapes and to form various contours on edges (p. 35).

**Benefactive (B)** - "A noun deriving benefit of the action of the verb."
Sharp blades and cutters ensure accurate work and make the tool much safer to operate (p. 41).

Compound (C) - "In accompaniment."

The most vital factor in stair design is the relationship between the rise and (riser) and run (tread minus nosing) (p. 351).

Temporal (T) - "When the verb is accomplished or occurs."

Do not remove any diagonal braces or spacer strips until after their installation is complete (p. 225).

Modified cloze techniques can be used as introductory exercises, included in self-instruction packets, adapted for games, or structured for remedial work. They provide an excellent method of coordinating in-class vocational work and English or remedial reading treatment. (Reference Note 3).

Exercise 4

Underline each word in the following passage which could be clozed by Fillmore rules, entering above the word the letter which indicates the rule used.

EXTERIOR WALL FINISH

The term "exterior finish" includes the application of all exterior materials of a structure. It generally refers to the roofing materials, cornice trim boards, wall coverings, and trim members around doors and windows. The installation of special architectural
woodwork at entrances or the application of a ceiling to a porch or breezeway area would also be included under this broad heading.

Previous units have described the application of the finished roof and the installation of the trim around windows and outside doors. This unit provides information about the construction and finish of cornice work and the materials and methods used to provide a suitable outside wall covering.

CORNICE DESIGNS

The cornice, also called an eave, is formed by roof overhang and provides a finished connection between the wall and the edge of the roof. It is an important element in the total appearance of a structure and the architectural style will determine to a large extent the design requirements. Fig. 12-1 includes a number of detailed cornice sections secured from architectural drawings of contemporary residential structures.

Diagrams of several closed or "boxed" cornice designs are illustrated in Fig. 12-2. An open cornice is sometimes used, exposing the rafters and underside of the roof sheathing. Wide overhangs are used extensively in modern buildings. These provide shade for large window areas, protect the walls, and add to attractiveness of the structure.

The rake is the part of a roof that overhangs a gable. It is usually enclosed with carefully fitted trim members.

(Wagner, W. H., 1979; p. 249)
SECTIONS 3 - 6
READING VOCATIONAL TEXTS
READING VOCATIONAL TEXTS

The following four sections each present a set of important content reading skills. Only those skills particularly relevant to vocational texts have been included. Moreover, each skill has been broken down into segments requiring no more than 5-10 minutes of class time every other day. All homework utilizes the text assignments you would normally require at that point in your course. Because students must pay careful attention to their text in order to complete the reading skill assignment, they should more thoroughly understand the content material than they ordinarily would.

Each section presents the given skill using a variety of vocational examples. Opportunities are then provided for you to apply the skills so that you can be assured of mastering each one.

Following the individual skill discussions is a section called "Textbook Application." It is here that you apply each skill to your own course textbook. This second application accomplishes three purposes: 1) It allows you to locate examples and sample exercises that you can use in your classroom, thereby greatly reducing extra preparation time reading instruction might entail; 2) It enables you to tailor the skills to your text; and 3) It gives you an additional practice opportunity, this time using the same materials your students will use.

At the end of each section are additional suggestions for teaching the new skills.
<table>
<thead>
<tr>
<th>SECTION</th>
<th>TIMING</th>
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<tr>
<td>3</td>
<td>Basic Vocabulary Skills Weeks 1 and 2</td>
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<td></td>
<td>Formal definitions</td>
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<td>Synonyms</td>
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<td>Illustrations</td>
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<td>4</td>
<td>Paragraph Comprehension Weeks 3, 4 and 5</td>
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<td>SQ4R Weeks 6, 7, and 8</td>
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<td>Teaching students to recognize and record complex information</td>
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</table>
SECTION 3
BASIC VOCABULARY SKILLS
Section 3

Basic Vocabulary Skills

Central to carpentry is its specialized technical vocabulary. Complete and rapid comprehension of this vocabulary is imperative for the student. This is particularly important because authors of occupational literature assume their readers have a basic understanding of important terms. Since it is essential for students to understand the technical terms in their field, most textbook authors have taken care to provide definitions and other comprehension aids. The simplest of these is the use of italics or boldfaced type to highlight important terms. Four other aids are discussed below: formal definitions, synonyms, illustrations, and glossaries. In addition, suggestions are made for teaching students how to make educated guesses when one of the other comprehension aids is not provided.

Formal Definitions

Often, an author will define an important technical term in the sentence or sentences that introduce it.

The valley is the internal angle formed by the junction of two sloping sides of a roof. (Anderson and Winslow, 1976, 48)

<table>
<thead>
<tr>
<th>term</th>
<th>definition</th>
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<tbody>
<tr>
<td>valley</td>
<td>internal angle formed when two sloping sides of a roof meet.</td>
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</table>
Clue words can warn the reader that a definition is included in the sentence. These include "is," "means," "is referred to," "is called," and "is defined as."

Exercise 5

Locate the technical term and its definition (or formula) in the following examples (remember that a technical term may include one word or several):

Exercises

A bill of materials is a table of information that tells the requirements for a given project (Feirer & Hutchings, 1976, 58):

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The combined slab and foundation, sometimes referred to as the thickened-edge slab, is useful in warm climates where frost penetration is not a problem (Anderson & Winslow, 1976, 15):

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<th>definition</th>
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Since the goal at this stage of construction is to enclose the structure and make the roof watertight, only those partitions that support the ceiling and/or roof (bearing partitions) are usually installed (Wagner, 1979, 142):

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<th>definition</th>
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The following formula can be used to determine the cubic feet for any square or rectangular area: when all dimensions are given in feet:

\[ \text{Cu. yds.} = \frac{\text{width} \times \text{length} \times \text{thickness}}{27} \]

(Wagner, 1979, 109).

term definition

Synonyms

As an alternative to a formal definition, an author may clarify a technical term by the use of a synonym. The synonym may be enclosed in commas or parentheses directly following the term or set off by the word "or."

Two types of concrete floor construction are the combined (or unified) slab and foundation and the independent slab and foundation (Feirer & Hutchings, 1978, 274).

term synonym

combined unified

Exercise 6

The members used to span over window and door openings are called headers or lintels (Anderson & Winslow, 1976, 34).

term synonym

An access hole (also called a scuttle hole) must be included in the ceiling frame to provide an entrance to the attic area (Wagner, 1979, 153).

term synonym
Illustrations

Carpentry literature relies heavily on illustrations to define important terms. Unfortunately, students often skip over the illustrations when they are reading. The first task of an instructor is to impress on students the need to immediately study the designated figure whenever it is mentioned in the prose (Ex: "See Fig. 8-2"). In the following example (Figure 14) those terms explained by an illustration are noted along with the number of the diagram. Forcing students to physically note this information is a useful first step in teaching them to use diagrams as comprehension aids. Later they will apply the visual definition to the prose automatically.
A gravel stop, Illus. 102, 103, should be used when finished roof is to be covered with gravel. In this application, the plyscord sheathing is covered with #15 felt -- A. The starter strip -- B, Illus. 102, is nailed or stapled in position. Asphalt cement is applied and a strip of webbing -- C, is embedded. Apply cement and nail gravel strip in position every 4". Apply cement and cover with another strip of webbing. Next apply a 24" wide strip -- D, and as many plys of 36" felt -- E, as job requires. (Brann, 1974, 64)
Exercise 7

Identify the illustrations and terms in Figure 15, then in the two remaining illustrations (Figure 16 and 17).

<table>
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<tr>
<th>Ill.#</th>
<th>terms</th>
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<td>(From Figure 16)</td>
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<td>Ill.#</td>
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<td>(From Figure 17)</td>
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<td>Ill.#</td>
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In many house designs, the living room and the dining or family room form an open "L." A wide, continuous ceiling area between the two rooms is often desirable. This can be created with a flush beam, which replaces the load-bearing partitions used in the remainder of the house. A nail-laminated beam, designed to carry the ceiling load, supports the ends of the joists. Joists are toenailed into the beam and supported by metal joist hangers (fig. 41, A) or wood hangers (fig. 41, B). To resist the thrust of the rafters for longer spans, it is often desirable to provide added resistance by using metal strapping. Strapping should be nailed to each opposite joist with three or four eightpenny nails. (Anderson & Winslow, 1976, 42)
In general, the conventional course (straight row) design is preferable to the staggered (or brick) design. (Montgomery Ward, 6)
Figure 17: Adhesives

There are numerous panel adhesives available. Most are packed in cartridges for application with a caulking gun, figure 11-10. Because of the number of available adhesives, it is advisable to follow the specific manufacturer's instructions. (Ball, 1975: 95)
Carpenters must often consult blueprints and other diagrams conveying work instructions. Generally, these utilize symbols which are either defined in a legend or which the carpenter is expected to already know. In either case, students should become adept at translating symbols.

Exercise 8

Below in Figure 18a is a list of common electrical symbols (Wagner, 1979, 83) and a house plan (Figure 18b) (Feier & Hutchings, 1976, 604). Circle and define in the margin five electrical symbols used in the plan. (Such an exercise can be done in class with transparencies or dittos).

Glossaries

Many current carpentry texts include glossaries at the end of the chapter or book. The teacher's task is to make sure the students use this aid. In the initial weeks of a course students can be required to read the glossary the night before beginning a new chapter. Initially, as they read the chapter and encounter a new word defined in the glossary they can note it on a separate piece of paper. While the notation is not important in itself, the requirement of writing it will force them to actively use the glossary. This requirement and the assigned previewing can be relaxed later in the term.
Figure 18a: Electrical Symbols
Educated Guessing

Sometimes an author makes the meaning of the word clear, but doesn't actually define it. More frequently, a term is defined once early in the book, but will be used later without definition. Students may not remember the initial definition. Encourage them to skip a word they don't know and read the surrounding sentences and then make an educated guess as to its meaning. This guess can be checked and refined as the word is used again. Students reading the following excerpt (U.S. Dept. of Agriculture; 1967; 18) might not understand the word "noncombustible." However, there are clues (see underlined phrases) which suggest that the word has something to do with fire. This guess is then verified by the final sentence.

Crop driers are fire hazards if they are improperly installed or operated. They should be installed in accordance with NFPA Code on Crop Driers. When existing storage is used for drying crops, the drier should be connected to the crib or bin by a noncombustible duct at least 0 feet long. Permanent, fire-resistant, complete drying units should be located at the distance from other buildings that is specified by insurance companies involved.

Many feed grinding and processin plants in the plants become very dusty, so are subject to the same hazards as grain elevators and feed mills. This hazardous dusty situation requires the installation of dusttight wiring and equipment and totally enclosed motors to prevent any spark from being exposed to fine dusty materials. Fine dust is a highly combustible material that will explode and burn with the same aspects as volatile fuels.
Exercise 3

In the sample paragraphs below an important word, one that might not be readily comprehended by students, is circled. Underline other words that might help you ascertain its meaning.

Before repainting, the probable cause of the trouble should be ascertained. If it is due to springtime blistering on localized areas on the house in the colder northern states, a more effective vapor barrier is needed. This can be obtained by painting the indoor side of the exterior walls. Two coats of aluminum paint plus two coats of decorative paint are best for sand-finish plaster. On smooth plaster, a primer-sealer and at least one coat of semigloss paint make a good barrier. Shutting off humidifiers will also help. (U.S. Dept. of Agriculture, 1972, 13)

When an exposed block foundation is used as a finished wall for basement rooms, the stack bond pattern may be employed for a pleasing effect. This consists of placing blocks one above the other, resulting in continuous vertical mortar joints. However, when this system is used, it is necessary to incorporate some type of joint reinforcing every second course. This usually consists of small diameter steel rods arranged in a grid pattern. The common bond does not normally require this reinforcing, but when additional strength is desired, it is good practice to incorporate this bonding system into the wall. (Anderson & Winslow, 1975, 10)
Exercise 10: Textbook Application

Select an introductory chapter from the vocational text you teach. Look for the vocabulary comprehension aids introduced above.

Formal Definitions

<table>
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<tr>
<th>Pg. #</th>
<th>Term</th>
<th>Clue word</th>
<th>Definition</th>
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Synonyms

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### Illustrations

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<tr>
<th>Pg. #</th>
<th>term</th>
<th>Pg. # Ill.</th>
<th>Terms defined by the drawing or photograph</th>
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### Glossary

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<tr>
<th>Pg. #</th>
<th>Terms found in the glossary (use each term only once)</th>
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Teaching Students Vocabulary Skills

Vocabulary skills can be introduced in the two weeks of class. Every-other-day one word can be explained and an example given. Then, four more examples can be given on a transparency, flip chart, or a board while the class locates the term and definition in a discussion. As part of their regular homework assignment, have students practice these skills: Select five words that you know are explained by the skill taught that day (synonym, formal definition, etc.). Have students prepare a sheet similar to the one you completed in the preceding text application section for formal definitions, synonyms, illustrations, and glossaries. It is more effective, though, for work on educated guessing to be done in class discussions.
The cloze technique can also be used to reinforce or check the basic vocabulary skills. Prepare a cloze selection from your text, omitting important technical terms that are explained by one of the techniques discussed. This can be used to determine whether students use these comprehension aids or know the vocabulary. It can also be used to demonstrate to them the usefulness of learning these skills.
SECTION 4
PARAGRAPH COMPREHENSION
A paragraph has three major components:

1) the subject (what is being talked about)
2) the main idea (the most important information about the subject)
3) the supportive information (facts or examples that make the information clearer)

Of course, the main idea is the most crucial, for the key points of a chapter or article are simply selected main ideas from component paragraphs.

Look at the following paragraph; what are its subject and main idea?

Redwood is an excellent insulator against heat and cold. And, because the heartwood contains no volatile resins, it is highly rated for its resistance to fire and flame spread. In fact, this property allows it to be used in construction of heat resistant safes and fire walls between commercial and industrial buildings. (California Redwood Association, Inc., 1)

At first it appears that the subject of this paragraph is "redwood as insulation." However, closer inspection shows that that is only one specific example of how redwood responds to heat and cold. The subject is actually "redwood and temperature" while the main idea, the most important information about this subject, is "redwood is highly resistant to heat and cold." The other specifics about insulation, resin, and construction uses simply provide supportive information.
Paragraph Subject

The key to finding the subject of a paragraph is finding the one topic that everything else in the paragraph is related to. A paragraph usually discusses only one small aspect of a larger topic, therefore, the subject must not be too general. It must identify the specific topic being discussed. At the same time, it must not be too specific, substituting an example of the subject being discussed for the subject itself.

Exercise 11

Read the following two paragraphs on oak floors (National Oak Flooring Manufacturers Association, 1971, 3, 4). In each case many specifics about oak flooring are given, each of which could easily, and incorrectly, be chosen as the subject. Students could also read the selections uncritically and choose "oak floors" as the subject, which is much too general. Instead, the subject must be inferred from the supportive information given.

Oak flooring, despite its long history, is a truly modern product and is available in a wide variety of styles, grades, sizes and finishes. The basic types of oak flooring are strip, plank, unit block and parquet. Its cost depends on the type selected, grade, whether it is plain or quartersawed, and whether or not it is pre-finished at the factory.

Subject _________________________________
During its lifetime, oak is almost completely immune to signs of age, sunlight and temperature. Oak flooring does not harden when cold nor soften when warm. Because it is scientifically kiln-dried, it adapts itself to the air's moisture content, reducing the possibility of expansion or shrinkage to a minimum.

Subject

Paragraph Main Idea

Often it is difficult to identify a paragraph's main idea.

The following four guidelines can help in its location:

1. If the paragraph includes the definition of a term, that term might be part of the subject. The definition might be part of the main idea.

2. If there are examples, these may be illustrating all or part of the main idea.

3. If a key word or phrase is repeated, it might be part of the subject or main idea.

4. Highlighted terms might be part of the subject or main idea.

Note that the word "might" is used in each instance. These guidelines can point to and possible main ideas they cannot automatically select the right one.

Exercise 12

Look at the following four paragraphs. First ask yourself what the paragraph is about (the subject). Then look for the main idea using the three guidelines. Note which guidelines (if any) are most helpful in each case.
Redwood is far more durable than any finish yet developed, and a finish need not be used to protect it. You can leave a fence unfinished, to weatherbleach ultimately to a driftwood gray; you can apply annual coats of water repellent to help stabilize the color at a buckskin tan; you can bleach the wood for a quicker driftwood gray effect than natural weathering can accomplish; you can stain the fence with either a light-bodied, penetrating stain (does not obscure the grain of the wood, but presents a uniform appearance) or a heavy-bodied stain (obscures the grain but not the texture). Do not use varnishes or other clear, film-forming finishes on exterior wood. Such a finish deteriorates quickly, and refinishing is difficult and expensive. (California Redwood Association, 1973, 21)

Guideline | Subject | Main Idea
---|---|---

Gutters, or eaves troughs, are used to collect and divert water away from eave lines and foundation systems. Gutters are usually made of metal or plastic and are available in a wide variety of styles and sizes. At one time, molded wood gutters were frequently used, but for economic reasons the metal gutter has now replaced the wooden gutter in popularity. (Ball, 1975, 36)

Guideline | Subject | Main Idea
---|---|---
Open stairways permit rapid spread of heat, smoke, and fire because they act as chimneys for hot, gas-laden air to rush from the lower to the upper floors. They are especially dangerous in spreading fire if their base is in a hall or room having wide, doorless openings into other rooms. Open stairways and wide, doorless openings between the stair hall and other rooms are often desirable to make an attractive arrangement of rooms. For fire protection, however, it is desirable to have openings leading from the stair hall provided with doors. A closed hall may also help to conserve heat in winter. (U.S. Dept. of Agriculture, 1967, 7)

A dormer is a framed structure projecting above a sloping roof surface, and normally contains a vertical window unit. Although its chief purpose is to provide light ventilation and additional interior space, it should also enhance the exterior appearance of the structure. (Wagner, 1979, 175)
The following segment from Feiner & Hutchings (1976, 354-356) contains four paragraphs. Skim is provided for you to note the subject and main idea for each paragraph.

Headers

Where windows or doors occur in outside walls or partitions, parts of some studs must be cut out. It is necessary, therefore, to install some form of headers over the doorway to support the lower end of studs that have been cut. Likewise, at the bottom of a window opening the "rough sill" supports the upper ends of studs that have been cut. The height of a header is determined by the length of the opening or door span. This information will be available from the building plans or local code requirements.

Headers are sometimes built-up trusses. In some cases 4" stock is used rather than two pieces of 2" material nailed together. This saves work and also allows the thickness of the header to be exactly the same as the width of a 2" x 4" stud. (When two 2" members are used for a header, the total thickness is only 3". This requires a 1/4" spacer to give the header the full 3" width of the stud.)

Framing wide openings such as double garage doors which require headers 16' to 18' long can be done with nailed plywood box beams. These headers can be fabricated on or off the building site. The design and construction of these headers is shown in Fig. 25-31d. The ends of the headers should be supported on studs or by framing anchors, depending on the local code requirements. The header lengths are obtained by measuring the layout of the bottom wall plates. The header is measured between the full studs. In the case of the header for the door shown in Fig. 25-14a, the header length would be 37 3/4".

It is best to number the openings (such as windows, doors, and fireplaces) for identification and then make a cutting schedule for all headers. One person can cut these to length and, if 2" material is used, nail them together. Use 16d nails, two near each end, and stagger the others 16" apart along the length of the header.
Don't forget to use 1/2" spacers between the members where the nailing occurs. Headers are then distributed to their locations on the subfloor in readiness for the assembly of the wall sections.

<table>
<thead>
<tr>
<th>Subject</th>
<th>Main Idea</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Paragraph Comprehension and Illustrations**

Paragraph comprehension can be reinforced by a greater use of illustrations. Generally, illustrations often summarize a process or provide vital information on building elements or techniques. In case statements must be read first, read the prose and then read the diagram, comparing each feature of the illustration to the related portion of prose. Comprehension and retention of the information provided by the diagram is facilitated if you summarize the illustration in your own words.

**Exercise 13**

Summarize the following two illustrations.

After you have made these preliminary decisions, you can determine the exact area to be tiled, through use of a "layout stick"—the purpose of which is to minimize the amount of waste tile by eliminating as many cut tiles as possible.
Obtain a long piece of wood -- such as a yardstick -- and mark off 4½" segments ... representing tile size. If you have tile samples, you could lay the samples beside the wood and mark the segments in accordance with the tile itself.

Now locate the lowest place in the floor or the wall you plan to measure. Place the layout stick at this point and measure up to the exact height of the tile placement. This will show you exactly how many rows of tiles you will need for that wall. (Montgomery Ward 1979, 116)

Summary Statement:

To determine the size of a girder, it is necessary to:
1. Find the distance between girder supports (span).
2. Find the girder load width. A girder must carry the weight of the floors on each side to the midpoint of the joists which rest upon it.
3. Find the "total floor load" per square foot carried by partitions to girder. This will be the sum of loads per square foot listed in the diagram, Fig. 18, with the exception of the roof loads which are carried on the outside walls unless braces or partitions are placed under the rafters, in which case a corner of the roof load is carried to the girder by joists and partitions. (Wagner, 1979, 116)
Live load - roof = Local requirements for wind & snow (usually 10 lbs per sq ft)
Dead load - roof of wood shingles, construction = 10 lbs per sq ft.

- Live load on attic floor = Local requirements (Usually 20 lbs per sq ft, trim only )
- Dead load of attic floor, not floored = 10 lbs per sq ft
- Dead load of attic floor when floored = 20 lbs per sq ft (Storage space)
- Dead load of partitions = 20 lbs per sq ft of floor area
- Dead load on second floor = Local requirements (Usually 40 lbs per sq ft)
- Dead load on second floor = 20 lbs per sq ft

Exercise 14: Textbook Application

Pick four paragraphs from your fourth week's reading assignment.
Identify the subject in each.

<table>
<thead>
<tr>
<th>Page #</th>
<th>Column #</th>
<th>Paragraph #</th>
<th>Subject</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Pick four paragraphs from your fifth week's reading assignment. Identifying the subject and main idea in each.

<table>
<thead>
<tr>
<th>Pg. #</th>
<th>Col. #</th>
<th>Para. #</th>
<th>Subject</th>
<th>Main Idea</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Pick a segment at least four paragraphs in length from your sixth week's reading assignment and note the subject and main idea of each important paragraph.

<table>
<thead>
<tr>
<th>Pg. #</th>
<th>Subject</th>
<th>Main Idea</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Pick two illustrations that clarify the meaning of a paragraph from the fifth, sixth, or seventh week assignment. Note the page number of the diagram and write a brief statement about it.

<table>
<thead>
<tr>
<th>Diagram</th>
<th>Summary Statement</th>
</tr>
</thead>
</table>

---

**Teaching Students to Understand Paragraphs**

Understanding the paragraph is the most difficult reading skill the carpentry instructor must teach. It is important to introduce the material slowly and incrementally as we have done here. The fourth week of class can be devoted to paragraph subject. Monday 5-10 minutes can be spent in a general introduction and discussion/practice locating subjects in sample sample paragraphs. Wednesday the three criteria can be applied to more sample paragraphs and students can look for the subject in specified paragraphs from the homework reading. Friday a few of the homework paragraphs can be discussed and one or two complex samples given. Friday's homework can include more paragraph assignments.

During week six, a similar procedure can be utilized to teach locating the main idea. Each day one of the four clues can
be introduced and applied along with the more general directions of what is the most important thing the author is saying in this paragraph." The paragraphs you identified in the text application can be assigned to the students with directions to find the subject and main idea. In the sixth week the class can be assigned the multiparagraph section you identified, recording the subject and main idea just as we did. They can also practice integrating the reading of illus. and prose.
SECTION 5
EFFECTIVE READING TECHNIQUE
Section 5: Effective Reading Technique

In all subjects, the time comes when we ask students to study by themselves. In many instances, these students do not know how to study. This section contains a brief overview and modification of a study technique originally devised by Francis Robinson.

The SQ4R Method of Study

Many elementary, secondary, and college students have not learned how to study a textbook assignment. A typical procedure is for the student to do nothing more than open his book and read the assignment. The more conscientious may follow this initial reading by a second or even a third reading of the same fruitless type. Research has found a good method of helping the student read a given selection with better understanding and better recall. It is called the SQ4R method. It involves six basic steps: (1) Survey, (2) Question, (3) Read, (4) Record, (5) Recite, (6) Review. Some of the things to be done in each of the six steps are discussed under appropriate headings below.

Survey:

Look through the whole assignment. Read the headings if there are any; read the summary if there is one. Try to get the general idea of the content of the whole lesson. Later you can place the details into the framework which you have in mind, and the entire lesson will mean more.
Question:

Think of the questions which are likely to be answered in the lesson. Often the headings can very easily be turned into questions. Use them! If any heading does not tell you plainly what question is to be answered in that section use this question: "What does the author expect me to learn about from studying this section?" If there are no paragraph headings, skim the section quickly for the main ideas.

Read:

Study the lesson to find the answers to the questions. Do not stop to read every word carefully, concentrate on finding the main point. You cannot remember all the facts you find, so you want to look for the important ones, of which there will be only one or two for each section. Don't pick out too many. Do not try to memorize the facts at this point; just sort out the ones you need as you go along.

Record:

Make study guides. Fold or rule a large-sized notebook paper lengthwise down the middle. On the left, list the topics discussed in the book. If there are paragraph headings in boldface type, use them. If not, list the main ideas found in the preliminary survey. Leave space between topics. When you have finished reading a section and picking out the one or two points to remember, list on the right the key words of the ideas or facts you have decided are most important for each topic. Do not do this until after you have read a section and thought about it. This is most important.

Recite:

Go back over the lesson immediately. Cover the right hand side of the paper and check the headings on the left. Ask yourself, "Do I remember what this section was about?" or "Can I answer this question?" If you find that you cannot you know that you must look at the key words, or even go back to the book if necessary, in order to restudy the particular part which you did not understand or have forgotten. Step 4 is very important: Giving yourself an immediate quiz of what you have just studied is the best possible way to prevent forgetting.
Practice until you can recite on the entire study guide without referring to the key words. Then practice some more. This extra practice is what really pays off.

Review:

Some time later, and always before an exam, go back to your headings and questions and quiz yourself. Reread only those parts which you have forgotten. If you have taken steps 1, 2, 3, 4, 5, and 6 faithfully, you will find that you do not have too much to restudy.

If students learn to change the heading within a chapter to questions and then read to answer those questions, much more will be obtained, than if they merely read and then answered questions at the end of the chapter. Indeed, what often takes place when we assign questions from the chapter ending is students read the questions and then copy only that information which answers the question without ever having read the chapter or designated pages. The process of formulating questions is a thinking exercise which tunes students into the assignment. Reading, studying, in this way is a life-long skill that really should be taught. As a skill, it may be more important than the content and concepts of the subject. (Robinson, 1970)

Exercise 15: Textbook Application

Select a portion of the chapter you assign in the seventh of eighth week of class and practice the SQ4R method.
Teaching SQ4R

Students have already learned how to locate the subject and main idea of a paragraph and how to distinguish these from information that is merely supportive. In the final "paragraph" assignments they practiced recording information in much the same manner as they will for SQ4R. This should facilitate SQ4R instruction. On Monday explain _surveying_ and have the students practice in class on the chapter currently assigned. Wednesday have them prepare _questions_ from some of the headings, either individually or as a group. They can continue this exercise for homework. Friday the _read_ and _record_ steps can be presented and compared with the subject/main idea work they have already done. Reading and recording can be practiced on the homework assignment and discussed the following day.

Teacher-made _notes_ reading can be shown on a transparency, on the board, or _video_ to allow students to check their own notes. Wednesday the _recite_ and _review_ steps are introduced with students pairing-up to quiz each other from the left-hand subject column. Beginning Wednesday night, they should be expected to utilize the SQ4R method on their assignments. The next two Fridays, and sporadically thereafter, students can quiz each other on their notes while the instructor walks around the room noting whether each student has followed the correct procedure.
At the beginning of the next chapter, students should again be required to perform the survey step in class and suggest some guide questions derived from the chapter headings. Review of the other steps should take place as needed.
SECTION 6
RECOGNIZING AND RECORDING COMPLEX INFORMATION
Recognizing and Recording Complex Information

Carpentry literature often highlights three important logical relationships: classification, comparison, and causality.

Classification, in its simplest form is simply listing.

The most desirable properties in a vapor barrier to be used under a concrete slab are: a) Good vapor transmission rating (less than 0.5 perm); b) resistance to damage by moisture and rot; c) ability to withstand normal usage during pouring operations. (Anderson & Winslow, 1976, 17)

Comparison and causality are straightforward and commonplace. One author compares hardwoods and softwoods while another discusses common problems that occur when laying foundations, emphasizing their possible causes. These three relationships are easiest to see and remember if the notes taken about them have a visual impact. Each of these charting techniques is given below.

Classification

The use of classification can be signaled by a colon (:) number or letters, or words such as "these include." At other times classification is simply introduced by a statement: "there are a number of types of concrete." Outlining is the easiest way to record classification.
A drawing consists of lines, dimensions, symbols, and notes. Lines show the shape of a product and include many details of construction. Fig. 3-8. Dimensions are numbers that tell the sizes of each part as well as overall sizes. The craftsman must follow these dimensions in making the materials list and the layout. Symbols are used to represent things that would be impractical to show by drawing, such as doors, windows, electrical circuits, and plumbing and heating equipment. Fig. 3-9. Some drawings also contain notes or written information to explain something not otherwise shown. Frequently in these notes abbreviations are given for common words (Feirer & Hutchings, 1976, 36).

Elements of a Drawing

A. Lines (shape and construction details)

B. Dimensions (sizes)

C. Symbols (represent complex things)
   1. windows, doors, plumbing, etc.

D. Notes (written information and abbreviations)

More complicated classification can be presented with the use of a more detailed outline,

I. __________
   A. __________
      1. __________
         a. __________
   B. __________
Exercise

On a separate piece of paper construct such an outline of this selection from Feirer and Hutchings (1975, 103-104).

STRUCTURAL INSULATING BOARD

Most structural insulating board is made from wood fibers. It comes in two grades - sheathing and insulation.

There are two types of sheathing-grade insulation board. In one type all the surfaces and edges are covered with asphalt. In the other type the fibers are impregnated with asphalt during manufacture. These boards usually come in 4' x 8' sheets, 25/32" thick. They also come in 2' x 8' sheets. Sheathing grade is used for insulation and sound control as well as for structural sheathing.

Insulation grade is made in decorative panels, decorative ceiling tile, V-notched plaster base, and roof insulation. The standard thicknesses of this type of board are 1/2", 5/8", 3/4", or 1", although thicker boards up to 2" to 3" for roof insulation are also made. Sometimes thicker board is made by using an insulating board in the middle and a 1/4" hardboard on both surfaces. Ceiling tiles are made in a wide variety of sizes with tongue-and-groove edges, and with a choice of finishes. They are also made with a series of small holes to improve the sound control. Ceiling tile can be cemented, clipped, stapled, nailed, or interlocked in place. Acoustical tile absorbs up to seventy percent of the noise in a room.

Comparison

While classification is commonly used in carpentry literature, it is seldom used alone. Once the elements of a topic have been classified into sub-topics, these sub-topics are usually compared. Charts with the topics to be compared along one axis and the features of comparison along the other facilitate retention and
<table>
<thead>
<tr>
<th>Product</th>
<th>Configuration</th>
<th>Per Square</th>
<th>See</th>
<th>Exposure</th>
<th>Underwriters' Listing</th>
</tr>
</thead>
<tbody>
<tr>
<td>W.A. Strip Slatte More Than One Thickness Per Strip</td>
<td>Various Edge, Surface Texture &amp; Application Treatments</td>
<td>230# to 400#</td>
<td>67</td>
<td>4</td>
<td>14-1/2&quot;</td>
</tr>
<tr>
<td>W.A. Strip Single Thickness Per Strip</td>
<td>Various Edge, Surface Texture &amp; Application Treatments</td>
<td>50# to 50#</td>
<td>30</td>
<td>4</td>
<td>12&quot;</td>
</tr>
<tr>
<td>Self-Sealing Strip</td>
<td>Conventional 2 Tab</td>
<td>250# to 500#</td>
<td>73</td>
<td>3</td>
<td>12&quot;</td>
</tr>
<tr>
<td>Self-Sealing Strip</td>
<td>2 or 4 Tab</td>
<td>215# to 325#</td>
<td>78</td>
<td>3</td>
<td>12&quot;</td>
</tr>
<tr>
<td>Self-Sealing Strip</td>
<td>No Cut Out</td>
<td>Various Edge and Texture Treatments</td>
<td>215# to 290#</td>
<td>38</td>
<td>3</td>
</tr>
<tr>
<td>Individual Lock Down</td>
<td>Several Design Variations</td>
<td>100# to 250#</td>
<td>72</td>
<td>3</td>
<td>12&quot;</td>
</tr>
</tbody>
</table>

(Wagner, 1979, 188)
are often provided by the author. If not provided, students can construct their own, making sure to read the complete comparison section before constructing their chart.

Exercise 17

Construct a chart for the following selection (Anderson & Winslow, 1976, 101-103).

FLEXIBLE INSULATION

Flexible insulation is manufactured in two types, blanket and batt. Blanket insulation (fig. 95,A) is furnished in rolls or packages in widths suited to 16- and 24-inch stud and joist spacing. Usual thicknesses are 1½, 2, and 3 inches. The body of the blanket is made of felted mats of mineral or vegetable fibers, such as rock or glass wool, wood fiber, and cotton. Organic insulations are treated to make them resistant to fire, decay, insects, and vermin. Most blanket insulation is covered with paper or other sheet material with tabs on the sides for fastening to studs or joists. One covering sheet serves as a vapor barrier to resist movement of water vapor and should always face the warm side of the wall. Aluminum foil or asphalt or plastic laminated paper are commonly used as barrier materials.

Batt insulation (fig. 95,B) is also made of fibrous material preformed to thicknesses of 4 and 6 inches for 16- and 24-inch joist spacing. It is supplied with or without a vapor barrier. One friction type of fibrous glass batt is supplied without a covering and is designed to remain in place without the normal fastening methods.

LOOSE FILL INSULATION

Loose fill insulation (fig. 95,C) is usually composed of
materials used in bulk form, supplied in bags or bales, and placed by pouring, blowing, or packing by hand. This includes rock or glass wool, wood fibers, shredded redwood bark, cork, wood pulp products, vermiculite, sawdust, and shavings.

Fill insulation is suited for use between first-floor ceiling joists in unheated attics. It is also used in sidewalls of existing houses that were not insulated during construction. Where no vapor barrier was installed during construction, suitable paint coatings, as described later in this chapter, should be used for vapor barriers when blown insulation is added to an existing house.

REFLECTIVE INSULATION

Most materials reflect some radiant heat, and some materials have this property to a very high degree (4). Materials high in reflective properties include aluminum foil, sheet metal with tin coating, and paper products coated with a reflective oxide composition. Such materials can be used in enclosed stud spaces in attics, and in similar locations to retard heat transfer by radiation. These reflective insulations are effective only when used where the reflective surface faces an air space at least 3/4 inch or more deep. Where a reflective surface contacts another material, the reflective properties are lost and the material has little or no insulating value.

Reflective insulations are equally effective regardless of whether the reflective surface faces the warm or cold side. However, there is a decided difference in the equivalent conductance and the resistance to heat flow. The difference depends on (a) the orientation of the reflecting material and the dead air space, (b) the direction of heat flow (horizontal, up, or down), and (c) the mean summer or winter temperatures. Each possibility requires separate consideration. However, reflective insulation is perhaps more effective in preventing summer heat flow through ceilings and walls. It should likely be considered more for use in the southern portion of the United States than in the northern portion.

Reflective insulation of the foil type is sometimes applied to blankets and to the stud-surface side of gypsum lath.
Metal foil suitably mounted on some supporting base makes an excellent vapor barrier. The type of reflective insulation shown in figure 95,D includes reflective surfaces and air spaces between the outer sheets.

RIGID INSULATION

Rigid insulation is usually a fiberboard material manufactured in sheet and other forms (fig. 95,E). However, rigid insulations are also made from such materials as inorganic fiber and glass fiber, though not commonly used in a house in this form. The most common types are made from processed wood, sugarcane, or other vegetable products. Structural insulating boards, in densities ranging from 15 to 31 pounds per cubic foot, are fabricated in such forms as building boards, roof decking, sheathing, and wallboard. While they have moderately good insulating properties, their primary purpose is structural.

Roof insulation is nonstructural and serves mainly to provide thermal resistance to heat flow in roofs. It is called "slab" or "block" insulation and is manufactured in rigid units ½ to 3 inches thick and usually 2 by 4 feet in size.

In house construction, perhaps the most common forms of rigid insulation are sheathing and decorative coverings in sheets or in tile squares. Sheathing board is made in thickness of ½ and 25/32 inch. It is coated or impregnated with an asphalt compound to provide water resistance. Sheets are made in 2- by 8-foot size for horizontal application and 4- by 8-feet or longer for vertical application.

MISCELLANEOUS INSULATION

Some insulations do not fit in the classifications previously described, such as insulation blankets made up of multiple layers of corrugated paper. Other types, such as lightweight vermiculite and perlite aggregates, are sometimes used in plaster as a means of reducing heat transmission.

Other materials are foamed-in-place insulations, which include sprayed and plastic foam types. Sprayed insulation is usually inorganic fibrous material blown against a clean surface which has been primed with an adhesive coating. It is often left exposed for acoustical as well as insulating properties.
Expanded polystyrene and urethane plastic foams may be molded or foamed-in-place. Urethane insulation may also be applied by spraying. Polystyrene and urethane in board form can be obtained in thicknesses from \( \frac{1}{2} \) to 2 inches.

**Cause and Effect**

Carpentry literature often seeks to teach students to diagnose and correct common construction problems. Such discussions are generally written in a cause and effect format. Again, a chart facilitates note-taking. In this case, causes are listed in one column opposite possible effects. The order of the columns is unimportant.

**LUMBER DEFECTS**

A defect is an irregularity occurring in or on wood that reduces its strength, durability or usefulness. It may or may not detract from appearance. For example, knots commonly considered a defect may add to the appearance of pine paneling. An imperfection that impairs only the appearance of wood is called a blemish. Some of the common defects include:

**KNOTS:** Caused by an imbedded branch or limb of the tree, Fig. 4-14. They are generally considered to be strength reducing - the amount depending upon the type, size and location, See Fig. 4-15.

**SPLITS AND CHECKS:** A separation of the wood fibers along the grain and across the annular growth rings. Usually occurs at the ends of lumber - a result of uneven seasoning.

**SHAKES:** A separation along the grain and between the annular growth rings. Likely to occur only in species with abrupt change from spring to summer growth.
PITCH POCKETS: Internal cavities that contain or have contained pitch in either solid or liquid form.

HONEYCOMBING: Separation of the wood fibers in the interior section of the tree. May not be visible on the surface of boards.

WANE: The presence of bark or the absence of wood along the edge of the board. It forms a bevel and reduces the width.

BLUE STAIN: A discoloration caused by mold-like fungi. Objectional in appearance in some grades of lumber but has little or no effect on strength.

DECAY: A disintegration of wood fibers due to fungi. Early stages of decay may be difficult to recognize. Advanced stages result in wood that is soft, spongy, and crumbles easily.

HOLES: Holes in lumber will lower the grade. They may be caused by handling equipment or by wood boring insects or worms.

WARP: Any variation from true or plane surface. May include any one or combination of the following: cup, bow, crook, and twist (also called wind). (Wagner, 1979, 57-58).

### LUMBER DEFECTS

<table>
<thead>
<tr>
<th>Defect</th>
<th>Cause</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knot</td>
<td>imbedded branch or limb</td>
<td>strength reducing</td>
</tr>
<tr>
<td>Splits &amp; Checks</td>
<td>uneven seasoning</td>
<td>separation wood fibers along grain</td>
</tr>
<tr>
<td></td>
<td></td>
<td>across rings</td>
</tr>
<tr>
<td>Shakes</td>
<td>abrupt spring summer</td>
<td>separation along grain</td>
</tr>
<tr>
<td></td>
<td>growth change</td>
<td>between rings</td>
</tr>
</tbody>
</table>
### LUMBER DEFECTS (CONT'D)

<table>
<thead>
<tr>
<th>Defect</th>
<th>Cause</th>
<th>Result</th>
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</thead>
<tbody>
<tr>
<td>Pitch pockets</td>
<td>cavities of solid or liquid pitch</td>
<td></td>
</tr>
<tr>
<td>Honeycombing</td>
<td>separation of interior wood fibers</td>
<td></td>
</tr>
<tr>
<td>Wane</td>
<td>bark or lack of wood on edge</td>
<td>reduces width</td>
</tr>
<tr>
<td>Blue Stain</td>
<td>fungi</td>
<td>discoloration</td>
</tr>
<tr>
<td>Decay</td>
<td>fungi</td>
<td>soft, spongy wood crumbles easily</td>
</tr>
<tr>
<td>Holes</td>
<td>equipment, insects</td>
<td>lower grade</td>
</tr>
<tr>
<td>Warp</td>
<td>off true surface</td>
<td>cup, bow, crook, twist</td>
</tr>
</tbody>
</table>

**Exercise 18**

Construct a chart from the following portion of a text section on "Correcting Common Paint Problems" (Feirer & Hutchings, 1976, 992-994).

### CORRECTING COMMON PAINT PROBLEMS

By adhering to the recommendations in this unit, paint problems will be kept to a minimum. There are paint problems which may develop as a result of factors other than improper construction techniques.

Improper paint application can also cause problems. Described here are some of the paint problems resulting from poor construction techniques or improper paint application. The recommended corrective procedures are also given.
FLAKING OR CHALKING ON MASONRY

This problem is caused by inadequate surface preparation. The paint flakes off in scales or powders and chalks off. Fig. 50-18. This problem can be corrected by:

1. Removing flaking and chalking paint by wire brushing or sandblasting.

2. Sealing all surface cracks from moisture with a concrete patching material or a good quality calking compound.

3. Applying a masonry conditioner according to the label directions.

4. Applying two top coats of latex house paint or exterior masonry paint according to label directions.

CRACKING AND ALLIGATORING

This problem is created in two ways. The previous paint film may have been applied in several heavy coats without sufficient drying time between coats, or the undercoater may not be compatible with the finish coat. Fig. 50-19. This problem can be corrected by:

1. Sanding smooth the cracked or alligatored surface.

2. Applying one coat of undercoater and one top coat of a recommended house paint according to label directions.

PEELING GUTTERS

Peeling or cracking on such surfaces as galvanized metal gutters and downspouts is caused by improper metal primer or no primer on the galvanized metal. The paint thus has little or no adhesion. Fig. 50-20. This problem can be corrected by the following method:

1. Strip off all loose paint with a scraper, wire brush, or, best of all, a power wire brush. It is very important that all loose paint be removed. If not, succeeding coats of paint will subsequently peel away too.
2. When finishing with an oil base top coat, prime the bare spots with a primer made for galvanized metal. When finishing with a latex top coat, apply it directly to the bare galvanized metal after cleaning with a solvent. Before applying the top coat, be sure to allow the solvent to evaporate.

3. Finish with a top coat of latex or oil base house paint. Apply two top coats when a color change is involved or substantial bare metal has been exposed.

CHECKING

Checking is caused by plywood veneer cracking from expansion and contraction as it weathers and ages. Fig. 50-21. This problem can be corrected by:

1. Sanding the surface smooth.

2. Soot priming the exposed bare wood and cracks with an exterior undercoater, if the cracked area is not extensive.

3. Filling the primed cracks with caulk.

4. Applying a top coat of recommended house paint.

NOTE: Should this problem be extensive, the best procedure is to replace the plywood. To prevent checking on new plywood, sand the surface smooth and apply one coat of latex wood primer and two coats of latex house paint according to label directions.

Exercise 19: Textbook Application

Select 3 paragraphs or sections from the text assignments for weeks nine, ten or eleven that include each of the logical relationships discussed above and complete a note chart on them.
Teaching Students to Recognize and Record Complex Information

Chart notetaking as demonstrated here can be introduced anytime after week six, whenever it is appropriate for your text. The three types of charts need not be presented at the same time. For convenience sake, it is assumed here that all will be introduced during weeks nine, ten or eleven. Each form should be presented on a separate day. If your text already presents charts or outlines of these types, the appropriate one should be presented first followed by one or two sample paragraphs or sections from which the students can construct charts as a class. Related homework assignments should be given as soon as the appropriate text selections are covered.
REFERENCE NOTES


2. Ibid. Support research demonstrates deceptive nature of mean as measure of central tendency in occupational curricular literature readability research.

3. Thornton, L. J. Overcoming Disadvantage By Reading Deficiency: The Cloze Teaching Technique. Journal of Studies in Technical Careers (Publication Pending). The material included herein was adapted from the above article and includes substantial direct quotation per copyright agreement provisions with the publisher.
REFERENCES


Bifold Installation Instructions, Amarillo, Texas: Maywood, Inc., (No Date).


