

A COMPARISON OF READING LEVELS OF POTENTIAL
MINE FOREMEN AND READABILITY LEVELS
OF WRITTEN MINING COMMUNICATION

A

THESIS

PRESENTED

TO

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AND CONTINUING EDUCATION
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MOREHEAD STATE UNIVERSITY

IN PARTIAL FULFILLMENT OF
THE
MASTER OF ARTS IN ADULT
AND CONTINUING EDUCATION

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DEDICATED

to

my father

ROBERT T. STAMPER

(December 29, 1914 - September 4, 1945)

and

my father-in-law

HAROLD G. LILE

(August 17, 1916 - February 20, 1972)

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Chapter 1

INTRODUCTION

An ancient Arab proverb freely translated means: "Language is a swift horse which carries a man deep into distant lands." There is much truth in this metaphor. It is also true, however, that the Arab's steed, if improperly handled, may carry him into desert wastes and deep trouble. It may become balky, carry him nowhere at all, or throw him disastrously.¹

This research problem was implemented to determine whether significant differences exist between the readability levels of written mine instructional communication and the reading levels of potential mine foremen who must interpret instructional communications. The complexity of this problem is self-evident. Yet, through research much additional information can be secured.

¹Harlan Logan, and Lawrence G. Blochman, Are You Misunderstood? (Wilfred Funk, Inc., 1965), p. vii.

OBJECTIVES

The objectives of this study are as follows:

1. To determine the reading levels of selected potential mine foremen.
2. To determine the readability levels of written operational material developed by their superiors.
3. To determine whether there exists a significant difference between the two which would contribute to possible problems of mine safety.

STATEMENT OF THE PROBLEM

The purpose of this study is to determine whether there is a significant difference between the reading level of potential mine foremen and written material printed for their use by mine superiors.

HYPOTHESES

I. Legal Interpretation of Materials

- A. There is no significant difference between the reading level of potential mine foremen and the readability level of written operational material developed by the foremen's superiors in the area of legal interpretation.
- B. There is a significant difference between the reading level of potential mine foremen and the readability level of written operational material developed by the foremen's superiors in the area of legal interpretation.

II. Instructional Training Materials

- A. There is no significant difference between the reading level of potential mine foremen and the readability level of written instructional training material compiled by their superiors.
- B. There is a significant difference between the reading level of potential mine foremen and the readability level of written instructional training material compiled by their superiors.

If there is a significant difference between the reading level of potential mine foremen and the readability level of written operational material developed by the foremen's superiors; then, this difference can be found by testing mine foremen for reading levels and testing written communications for readability levels.

Definitions

Written Communication: any written form to express instruction, information, or operational procedures. The terms, operational materials, written materials, and written communication were used interchangeably.

Reading Level: any grade level a person has achieved in his reading ability as compared to norms.

Readability Level: any grade level difficulty of written material as determined by as appropriate readability formula.

Mine Superiors: any individual, firm, agency, or corporation operating or supervising the operation of a coal mine or any part thereof including Federal or State regulators. The terms, superintendent, superior, or operator, were used interchangeably.

Mine: any open pit or underground workings from which coal is produced for sale, exchange, or commercial use. The term was used in this study to denote underground workings only.

Foremen: any person whom the operator or superintendent places in charge of the workings of the mine and persons employed therein. This term refers to potential mine foremen who were attending Kentucky mine foremen training classes.

Chapter 2

REVIEW OF THE LITERATURE

For background data or information, one needs to consider the problems and process of communication between management and their subordinates of mine and related heavy industries.

GOALS OF COMMUNICATION

Communication has four goals; informing, understanding, accepting, and action. The unknown often provokes fear and paralysis mentally as well as physically. The informed person feeling more secure is cooperative and willing to try new and better methods. Communication, then, first conveys knowledge. If it is well used, communication deepens knowledge into understanding. An informed person can be expected to behave in a desired manner because he has acquired new beliefs and knowledge.¹

¹Harold P. Zelko, and Harold J. O'Brien, Management-Employee: Communication in Action, (Howard Allen, Inc., Cleveland, 1957), p. xi.

DEFINITIONS OF COMMUNICATION

As Lee Thayer has indicated, there are more than twenty-five conceptually different definitions of communication in the literature.¹ Yet, when one examines them, as Professor Robert L. Minter did, some common elements are found. Communication is the transmission and interchange of facts, ideas, feelings, and/or courses of action. It is an event or happening that takes place. When communication is properly perceived, it influences and changes the information and behavior of an individual. Mental or emotional concepts are conveyed by means of symbols from one person to another.²

CHARACTERISTICS OF COMMUNICATION

Communication is a two way process. For example: management might distribute a policy bulletin, to a group of supervisory personnel, however, not until there is some response--which must be observable behavior--or unless the management checks to see if the policy is being followed,

¹Lee O. Thayer, "On Theory Building in Communication: Some Conceptual Issues," The Journal of Communication, Vol. XIII, No. 4, December 1963, p. 219.

²Robert Minter, "A Denotative and Connotative Study in Communication." The Journal of Communication, Vol. XVIII, No. 1, March 1968, pp. 26-36.

does management know how effective is the written material. In other words, there must be some type of feedback observed.

Because two or more people are involved, communication is also a social process.¹ Written communication must, therefore, contain three elements: a source, a message, and a receiver.

PROBLEMS FOR THE SOURCE

The first test of the effectiveness of a written communication is it must be understood by the recipient. Unless he has comprehended the message the reader can become neither interested nor motivated to respond favorably.² It was Drucker who said, "The manager has a specific tool: information. He does not 'handle' people; he motivates, guides, and organizes people to do their own work. His tool--his only tool--to do this, is the spoken or written word."³ No decision making, no purposeful control, no comprehension of what is happening, is possible without informative

¹Leland Brown, Communication Facts and Ideas in Business (Prentice-Hall, Inc., New Jersey, 1970), pp. 2-8.

²Brown, p. 102.

³P. F. Drucker, The Practice of Management (Harper and Row, New York, 1954), p. 346.

information sharing. Information flow in a communication network is the lifeline of a business enterprise.¹

Many writers are like Doctor Rashdall. "A celebrated authority on Canon law and medieval universities, Dr. Hastings Rashdall, was one of those who could ride, but not understand a bicycle. One day, for example, having had a puncture in his front tyre(sic), he was found vigorously pumping up the back one; when a passer-by pointed this out to him, he remarked, 'What? Do they not communicate?'" Perhaps in our attempts to communicate with our subordinates, we strenuously pump in information at one end of a form and hope somehow it will find its way to the other."²

Zelko lists six principles which would help elevate many communication problems. His principles are:

1. Keep it simple;
2. Keep it organized;
3. Keep it short;
4. Keep it concrete;
5. Keep it familiar; and,
6. Keep it palatable.³

When a writer follows these principles, his message is more likely to be better organized and more readable. If

¹Samuel Eilon, "Some Notes on Information Processing," The Journal of Management Studies, May-1968, pp. 139-153.

²T. M. Higham, "Basic Psychological Factors in Communication," Managerial Control Through Communications, (John Wiley and Sons, New York, 1968), p. 153.

³Zelko, p. 143.

a writer does not come directly to the point, the material becomes irritating and therefore evokes an unfavorable response. Skilled writers make their messages vibrant, comprehensive, and provocative.¹

PROBLEMS OF THE MESSAGE

Since it is essentially frozen and precise, written communication serves some very important organizational and managerial ends. Written communications:

1. permit data and information to be stored and retrieved for either short-run or long-run problem solving and decision making;
2. can give the manager data and information inherently more reliable and valid than oral communication.
3. can be readily verified and authenticated;
4. permit objective reference; and,
5. are susceptible to review and critical judgement.²

Colin Cherry has indicated that written communication is reliable, accurate, precise, timely, and valuable.³ Stating basically the same thing Harold Zelko said, "Results could be obtained through written communications which the oral

¹Zelko, pp. 144-148.

²George T. Vardaman, Cutting Communication Cost and Increasing Impacts, (John Wiley and Sons, New York, 1970), pp. 34-36.

³Colin Cherry, On Human Communications (The M.I.T. Press, 1968), p. 167.

medium could not achieve." He listed the following as advantages for the written medium:

1. a written message is likely to be wider in scope than a spoken one;
2. a written message is permanent;
3. a written message becomes a vital part of organizational files; and
4. the written medium when properly used has the distinctive attribute of exactness.

Brown stated, "Written communication. . . .can be used to deal with special situations, problems, and happenings that are of particular interest. . . ." ²

PROBLEMS OF THE DESTINATION

When a writer directs his thoughts toward another person through a written communicate, he must consider or relate to the reader's competence by considering: (1) reader intelligence; (2) reader education; and (3) reader conditioning.

By reader intelligence we mean the ability to observe and to think. Reader education includes formal schooling and skill training plus experience in living. Finally reader conditioning refers to the predictable response of the reader to the written document.

¹Zelko, p. 132.

²Brown, pp. 20-21.

When writers wish to communicate, they must consider the total personality of their readers. Not to do so is to run the risk of failing to reach the recipient.¹

Research developed within an industry to determine possible communication problems particular to that industry is usually not shared with the public. (See Appendix A for sample letter.) Although industry is reluctant to release information gathered from its findings, Brydle found that technical manuals in industrial training were inadequate. This combined with the student's lack of serious attitude presented a real problem in the area of proper communication.²

CONCLUSION

As the reader can see, the problem of written communication is complicated and complexed. Even when trained specialists attempt to prepare written communication for a specific population, they often fail. While testing textbooks, which were presumably written for ninth graders by experts, Miller found that the readability range was from the moderately excessive level of tenth grade and upward. He

¹Vardaman, pp. 135-161.

²John Robert Brydle, Analysis of Major Problems Encountered by Leading Electronics Systems Manufacturers in the United States. N. Ed. 1960, Wayne State University, p. 33, Department of Industrial Education.

also found that at least forty per cent of the samples taken from the books had readability ratings of tenth grade level or higher. These textbooks, prepared by experts, were supposedly written for ninth graders.¹

It is apparent that improper communications from the top level of management contributes to a large measure to the problem of written communication as one can see by the reluctance on the part of industry to share what its research reveals.

¹Wilbur R. Miller, Levels of Readability of General Shop Textbooks Compared with Reading Abilities of Ninth-Grade Industrial Arts Students. Ed D. 1960, University of Missouri, 111. p. 35.

Chapter 3

METHODOLOGY

Population Tested

The population tested was from the Appalachian area which is a territory of selected counties in thirteen states from New York in the north to Alabama in the south where sixty-eight per cent of adults over twenty-five years of age had not finished high school in 1964; and 11.6 per cent had less than a fifth grade education.¹ Those tested were from an area in Eastern Kentucky where the median years of attendance in a formal academic setting was 7.7 for the male population.²

Men who submitted to the reading test will be part of the supervisory force in an industry that has had 206 fatalities in the Appalachian area of Kentucky for the years 1966-1970 with 75 of that number in the year 1970 alone. This

¹Adult Basic Education, The Michigan Institutional Survey and Consulting Service, 6330 Daly Road, Dexter, Michigan (August-1970), p. 5.

²U.S. Census of Population, 1960, cited by the Area Development Office, Commonwealth of Kentucky, Development Data. (Frankfort: 1967), p. 61.

number amounts to one fatality for each 1,407,959 tons of coal mined.¹

Selection

Seventy-four members of the training classes of the Kentucky Department of Mines and Minerals were tested for reading levels. Of the seventy-four selected, 100 per cent agreed to take the reading test. The tests were given with the approval of the chairman of Mine Foreman and Inspector Examinations, Mr. Harreld Kirkpatrick, commissioner of the Department of Mines and Minerals in Kentucky.

It was learned from Mr. Kirkpatrick and his assistant, Mr. J. H. Mosgrove, that there were three full-time training specialists employed by the Kentucky Department of Mines and Minerals for as many mining districts in Eastern Kentucky. The commissioner suggested three criteria which should be met in the selection of the appropriate district. First, the entry should be made in the district which would interfere as little as possible with the announced training schedule. Secondly, the entry should be made into the district which would be conducive to a good relationship with the men attending the training classes; and thirdly, the test

¹H. N. Kirkpatrick, Annual Report of Kentucky Department of Mines and Minerals, (Lexington: ;970), pp. 141-145.

could be administered to the men only on a voluntary basis.

The district selected based upon these criteria had two training centers with two classes meeting at different times at each center. Because there is movement from mine to mine and consequently from district to district, it was assumed that any one of the three districts would contain significant representation to warrant this approach in the selection of a sample district. Because Adams found that no significant differences existed between the duties of foremen in larger companies and smaller companies, no attempt was made to identify a comparison between the men and the size of the mine in which they were employed.¹

Taxonomy of Reading Test

Three types of reading tests were useful in gathering data for this research study. They were Screening test, Achievement test, and Diagnostic test.

Screening Test: Screening tests are short, easy to administer test, that can be given in order to make a fast judgement in placement of a subject.

¹Adams, A. Aron F., Specialized Tasks Performed by Foremen in Selected Small Industrial Companies. Ed. D. 1961, University of Cincinnati, p. 131. (Cincinnati, Ohio).

Achievement Test: Achievement test are comprehensive test which are useful in comparing a subject with a group norm.

Diagnostic Test: Diagnostic test are used to test in detail a subject's strength or weakness in a particular skill.

ANALYSIS OF READING TEST

The three types of tests listed above have certain weakness which had to be considered before final selection of the test instrument was made.

Although short and easy to administer, the screening test are designed for grade levels, not reading achievement levels. Also, word lists are contained within this type of test which supposedly are appropriate for a specific grade level. The basic problem with word lists is that they do not indicate knowledge of word meaning or ability to understand written materials.¹

An achievement test, although comprehensive indicator of a subject's performance, are designed to measure how a subject compares to the standardization sample (norm) in his knowledge of a particular subject area.² This type of

¹Robert H. Arents, Joan Fisher, and Jane Flaherty, Guidelines: Testing Adults Basic Education Students, The Office of Adult Basic Education, State of New Jersey, (Trenton: 1971). pp. 2-3.

²Arents, p. 3.

instrument may be appropriate in placement of a subject in rank order within a group, however, this placement procedure can be questioned. For example, we have no real basis for deciding what a precentile of 76, raw score of 132, or a grade score of 5.5 means so far as the actual reading ability of a given subject is concerned.

Although designed to test in detail a subject's actual strengths or weakness in a particular skill, the oral diagnostic test may be questioned as to its reliability because of its difficulties in judging word errors, noting phrasing, inflectual changes, and symptoms of difficulty. Typical procedures of testing call for oral reading at sight-- a stressing situation for even the most proficient reader.¹ Also, researchers have cited indisputable evidence that adults in their early adult life do begin to suffer losses in visual proficiency.² Taking this visual problem into consideration, it becomes self-evident that this type of instrument could potentially prove to be inappropriate for ascertaining the correct reading level for adults.

¹Robert E. Lowell, "Problems in Identifying Reading Levels with Informal Reading Inventories" (paper presented at the International Reading Association Conference, April 30, and May 3, 1969. Kansas City, Mo.).

²Curtis Ulmer, Teaching the Disadvantaged Adult (Washington: The National Association for Public Continuing and Adult Education, 1970), p. 10.

SELECTION OF READING TEST

It is evident from the study of the testing literature that each type of test instrument could be questioned as to the degree of usefulness that each offer in the accurate placement of subjects.

Placement of subjects according to grade levels was determined by use of an instrument which met the following criteria: (1) appropriate for the population tested; (2) administering ease; (3) appropriate evaluation of the selected instrument; and (4) appropriateness for the administrator.

Test Evaluation

The Individual Reading Placement Inventory (IRPI) would be appropriate to use with this population tested because it is informal and contains elements of flexible practicality and ease of administering. This type of test, having no school setting, tends to make the subject feel more relaxed and responsive.

The IRPI, developed for adults by Smith and Bradtmueller, has been evaluated with the following results:¹

¹Arents, (IRPI), pp. 1-5.

1. Validity (content):
 - a. ability to call words assumed to be on the grade levels of the specified list.
 - b. ability to recognize words in context.
 - c. exhibits content and concurrent validity.

2. Correlation coefficient:

a. ABE Student Survey	146	.89
b. Stanford Achievement	75	.78
c. California Achievement	104	.87

3. Reliability: (with adults)
Ranges from .91 to .98

Conversely, the Tests of Adult Basic Education (TABE-D), developed also for adults, would be appropriate to use with this population tested.

The TABE-D has been evaluated with the following results:¹

1. Validity:
 - a. ability in choosing one out of four words that means the opposite of a given word. Involves math, science, social science, and a general vocabulary.
 - b. ability in following directions, reference skills, getting the main idea, sequence of events, drawing conclusions, and finding facts.
All multiple choice.
 - c. exhibits criterion validity.

2. Correlation coefficient:
Compared with the California Achievement Tests, Junior High Level, Form W which corresponds with Form 1 of TABE-D with the reliability coefficient as .95.

¹Arents, (TABE-D), pp.1-7

The TABE-D was selected for use in this study based upon the following desirabilities:

1. students could leave the testing center when individually finished with the test;
2. administrator was more familiar with the standardized TABE-D than he was with the oral response IRPI;
3. known coefficients were high;
4. raw scores could easily be converted to grade levels; and,
5. California Test Bureau, developer of TABE-D, is a reputable test publisher, having produced a number of widely used tests.

Chapter 4

SELECTION OF THE READABILITY FORMULA

The Readability Concept

The concept of readability formulas was unknown outside a limited group of educators as late as 1944. Although some formulas were developed and used, all were too complicated and too hard for practical use. At that time Robert Gunning started work on a readability formula giving reliable measurement and centering the writer's attention on those factors that cause the most difficulty for reading.¹ Until Gunning began research into readability problems, scholars took into consideration the following factors when developing readability formulas:

1. Number of different words in a sample of writing;
2. Number of special words (Prepositions, adjectives, and conjunctions);
3. Number of words not on a special word list;
4. Nature of a sentence structure (phrases, clauses); and
5. Number and nature of references to persons.

¹Robert Gunning, The Technique of Clear Writing, (McGraw-Hill Book Company, New York, 1968), p. 31.

Diversely, Flesch and Gunning said: "1. If you measure just the length of words, you get a good picture of their difficulty, and, 2. If you measure the average length of sentences, you are really measuring their ease or difficulty."

Although they agree on the above listed concepts, Gunning's formula is the easiest and most practical to use because Flesch's would count each syllable while Gunning's would count only syllables in difficult words. Difficult words are defined as words which contain three or more syllables. Also, Gunning's formula converts its data into grade-in-school reading level while Flesch's formula compares its data to a reading ease score based from a very difficult to a very easy chart.¹

The Gunning readability formula was chosen by the writer for the following reasons:

1. Gunning's formula was found to be the most practical and easiest.
2. Gunning's formula converts its data into grade levels corresponding with the reading test, TABE-D.

¹George R. Klare, and Robert S. Laubach, What Readability Can Do For You, (New Readers Press, Syracuse, New York), p. 6.

SELECTED MATERIALS

The Federal Register¹ and Laws Governing the Mining of Coal and Clay² were used to determine whether foremen encountered reading difficulties in interpreting laws governing their industry. Respectively, these materials are the federal and state mandatory safety standards for underground coal mines.

Also, the Coal Mining Reference Book³ and the Mining Law⁴ were used in determining whether the potential foremen had difficulty comprehending their training manuals.

¹**U.S. Department of the Interior, Bureau of Mines, Federal Register, Vol. 35, of Mandatory Safety Standards, Underground Coal Mines, No.226 (Washington: Government Printing Office, 1970), pp. 17890-17929.

²**Kentucky, Laws Governing the Mining of Coal and Clay, Chapters 351-352 (1970).

³**Kentucky Mining Institute, Coal Mining Reference Book, (1958).

⁴**Kentucky Department of Mines and Minerals, Mining Law: Governing the Mining of Coal, (Date Unknown).

Chapter 5

FINDINGS

An analysis of variance and 'T' ratio were applied to the data in an effort to determine statistical significance of difference at the .01 level of confidence between each of the written materials tested for readability and the reading levels of potential mine foremen. There was no attempt made to explain the causation of statistical significance except to point out that such differences are caused by something other than chance.

An inspection of the data presented in this section reveals the following:

1. There is a significant difference between the mean reading level of the potential mine foremen (8.45) and the readability level of the Federal Register (25.28), (Tables 1&2).
2. There is a significant difference between the mean reading level of the potential mine foremen (8.45) and the mean readability level of the Kentucky Statutes (16.10), (Tables 3&4).
3. There is no significant difference between the mean reading level of potential mine foremen (8.45) and the mean readability level of Mining Law (9.76), (Tables 5&6).
4. There is no significant difference between the mean reading level of the potential mine foremen (8.45) and the mean readability level of the Coal Mining Reference Book, (8.92), (Tables 7&8).

Table 1

SUMMARY OF THE ANALYSIS OF VARIANCE BETWEEN THE
 READING LEVEL OF POTENTIAL MINE FOREMEN AND THE
 READABILITY LEVEL OF THE FEDERAL REGISTER

SUBJECT TESTED	MEAN OF SUBJECT	SD	N
Miners	8.45	2.19	74
<u>Federal Register</u>	25.28	11.76	10

	SUM OF SQUARES	DF	VARIANCE	F RATIO
Between	141.62	1	141.62	6.67*
Within	1740.10	82	21.22	

*Significant at the .01 level.

Table 2

SUMMARY OF THE 'T' RATIO BETWEEN THE READING LEVEL
OF POTENTIAL MINE FOREMEN AND THE READABILITY
LEVEL OF THE FEDERAL REGISTER

SUBJECT TESTED	MEAN OF SUBJECT	SD	DEVIATION SQUARED	N	DF	'T' RATIO
Miners	8.45	2.19	4.79	74	73	4.52*
<u>Federal Register</u>	25.28	11.76	138.29	10	9	

*Significant at the .01 level.

Table 3

SUMMARY OF THE ANALYSIS OF VARIANCE BETWEEN THE
 READING LEVEL OF POTENTIAL MINE FOREMEN AND THE
 READABILITY LEVEL OF THE KENTUCKY STATUTES

SUBJECT TESTED	MEAN OF SUBJECT	DF	N
Miners	8.45	2.19	74
<u>Kentucky Statutes</u>	16.10	11.76	10

	SUM OF SQUARES	DF	VARIANCE	F
Between	29.26	1	29.26	4.61*
Within	520.42	82	6.34	

*Significant at the .01 level.

Table 4

SUMMARY OF THE 'T' RATIO BETWEEN THE
 READING LEVELS OF POTENTIAL MINE
 FOREMEN AND THE READABILITY
 LEVEL OF KENTUCKY STATUTES

SUBJECT TESTED	MEAN OF SUBJECT	SD	DEVIATION SQUARED	N	DF	'T' RATIO
Miners	8.45	2.19	4.79	74	73	5.7*
<u>Ky. Statutes</u>	16.10	4.05	16.40	10	9	

*Significant at the .01 level.

Table 5

SUMMARY OF THE ANALYSIS OF VARIANCE BETWEEN
THE READING LEVEL OF POTENTIAL MINE
FOREMEN AND THE MINING LAW

SUBJECT TESTED	MEAN OF SUBJECT	SD	N
Miners	8.45	2.19	74
<u>Mining Law</u>	9.76	2.40	10

	SUM OF SQUARES	DF	VARIANCE	F
Between	.858	1	.858	.17*
Within	413.99	82	5.04	

*Not significant at the .01 level.

Table 6

SUMMARY OF THE 'T' RATIO BETWEEN THE
 READING LEVEL OF POTENTIAL MINE
 FOREMEN AND THE MINING LAW

SUBJECT TESTED	MEAN OF SUBJECT	SD	DEVIATION SQUARED	N	DF	'T' RATIO
Miners	8.45	2.19	4.79	74	73	1.60*
<u>Mining Law</u>	9.76	2.40	5.76	10	9	

*Not significant at the .01 level.

Table 7

SUMMARY OF THE ANALYSIS OF VARIANCE BETWEEN THE
 READING LEVEL OF POTENTIAL MINE FOREMEN
 AND THE READABILITY LEVEL OF THE
COAL MINING REFERENCE BOOK

SUBJECT TESTED	MEAN OF SUBJECT	SD	N
Miners	8.45	2.19	74
<u>Coal Mining</u>	8.92	2.79	10

	SUM OF SQUARES	DF	VARIANCE	F
Between	.11	1	.11	.02*
Within	434.26	82	5.29	

*Not significant at the .01 level.

Table 8

SUMMARY OF THE 'T' RATIO BETWEEN THE READING
LEVEL OF POTENTIAL MINE FOREMEN AND
THE READABILITY LEVEL OF THE
COAL MINING REFERENCE BOOK

SUBJECT TESTED	MEAN OF SUBJECT	SD	DEVIATION SQUARED	N	DF	'T' RATIO
Miners	8.45	2.19	4.79	74	73	1.64*
<u>Coal Mining</u>	8.92	2.79	7.78	10	9	

*Not significant at .01 level.

Chapter 6

SUMMARY AND RECOMMENDATION

Summary

It has been the purpose of this research to identify the possible significant difference which might contribute to mine problems between the reading level of potential mine foremen and the readability level of (1) legal written communication and (2) manuals used in the training classes of men attempting to achieve their foreman certificate.

To achieve the purpose of this study, an interview was scheduled with a president of a coal operator's association in Eastern Kentucky and later with the Commissioner of the Kentucky Department of Mines and Minerals to ascertain whether they felt that such a study as this was valid, needed, and would support such a study. (See Appendix B&C for sample communication.) With a positive reply from both sources, seventy-four men of a training district in Kentucky were tested for reading levels. The results of this training were compared with four reading materials which have been mentioned previously in this study--with interesting results obtained.

Table 9
SUMMARY OF ALL DATA COLLECTED

	READABILITY MEAN (N=10)	READING MEAN	F RATIO	'T' RATIO
<u>Federal Register</u> (N=10)	25.28	8.45	6.67**	4.52**
<u>Kentucky Statutes</u> (N=10)	16.10	8.45	4.61**	5.70**
<u>Mining Law</u> (N=10)	9.76	8.45	.17*	1.60*
<u>Coal Mining</u> (N=10)	8.92	8.45	.02*	1.64*

**Significant at the .01 level.

*Not significant at the .01 level.

Recommendations

Based upon this investigation regarding the comparison of reading levels and readability levels of subjects within the mining industry, the following recommendations are made:

1. The United States Department of the Interior should make all possible effort to reduce the readability level of the Federal Register.
2. Kentucky's Legislative Research Commission should make all possible effort to reduce the readability level of the Kentucky Statutes.
3. Further research should be conducted which would include testing reading levels of foreman candidates entering and completing training classes to ascertain if their attendance could be an important variable in understanding legal written communication.
4. Further research should be conducted which would include subjects from a broader geographical area in order to ascertain whether a significant difference of reading levels exist between different national regions.
5. Further research should be conducted which would include men who presently hold their foreman certificate to ascertain whether a significant difference exists between their mean reading level and the mean readability level of materials they must interpret.
6. Men with less than junior high reading ability should be encouraged--through some incentive offered by their employer--to enroll in an Adult Education Class.

BIBLIOGRAPHY

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Adams, Aaron, F., Specialized Tasks Performed by Foremen in Selected Small Industrial Companies. Ed. D. 1961, University of Cincinnati.

Adult Basic Education. The Michigan Institutional Survey and Consulting Service, 6330 Daly Road, Dexter, Michigan August 1970.

Arents, Robert H., and others, Guidelines: Testing Adult Basic Education Students. The Office of Adult Basic Education, State of New Jersey, Trenton: 1971.

Brown, Leland, Communicating Facts and Ideas in Business. Prentice-Hall, Inc., New Jersey 1970.

Brydle, John Robert, Analysis of Major Problems Encountered by Leading Electronics Systems Manufacturers in the United States. M. Ed. 1960, Wayne State University, Department of Industrial Education.

Cherry, Colin, On Human Communications. The M.I.T. Press, 1968.

Coal Mining Reference Book. Kentucky Mining Institute, Frankfort-1958.

Drucker, P. F., The Practice of Management. Harper and Row, New York 1954.

Eilon, Samuel, "Some Notes on Information Processing," The Journal of Management Studies. Vol. V, May 1968.

Federal Register. Department of the Interior, Bureau of Mines, Volume 35, Washington: 1970.

Gunning, Robert, The Technique of Clear Writing. McGraw-Hill Book Company, New York, 1968.

Higham, T. M., "Basic Psychological Factors in Communication," Managerial Control Through Communication. John Wiley and Sons, Inc., New York 1968.

Kirkpatrick, H. N., Annual Report of Kentucky Department of Mines and Minerals. Lexington: 1970.

Klare, George R., and Laubach, Robert S., What Readability Can Do For You. New Readers Press, Syracuse, New York.

Laws Governing the Mining of Coal and Clay. Legislative Research Commission, Commonwealth of Kentucky: 1970.

Logan, Harlan, and Lawrence G., Are You Misunderstood? Wilfred Funk, Inc., New York 1965.

Lowell, Robert E., "Problems in Identifying Reading Levels with Informal Reading Inventories" (paper presented at the International Reading Association Conference, April 30 and May 3, 1969, Kansas City, Mo.).

Miller, Wilbur R., Levels of Readability of General Shop Textbooks Compared with Reading Abilities of Ninth-Grade Industrial Arts Students. Ed. D. 1960, University of Missouri.

Mining Law: Governing the Mining of Coal in the State of Kentucky. Kentucky Department of Mines and Minerals, Frankfort.

Minter, Robert L., "A Denotative and Connotative Study in Communication," The Journal of Communication. Vol. XVIII, No. 1, March 1968.

Thayer, Lee O., "On Theory Building in Communication: Some Conceptual Issues," The Journal of Communication. Vol. XIII, No. 4. December 1963.

Ulmer, Curtis, Teaching the Disadvantaged Adult. Washington: The National Association for Public Continuing and Adult Education, 1970.

U.S. Census of Population 1960, as cited by the Area Development Office, Commonwealth of Kentucky, Development Data, Frankfort: 1967.

Vardaman, George T., and others, Cutting Communication Cost and Increasing Impacts. John Wiley and Sons, Inc., New York, 1970.

Zelko, Harold P., and Harold J. O'Brien, Management-Employee Communication in Action. Howard Allen, Inc., Cleveland 1957.

APPENDIX A

CORRESPONDENCE RECEIVED FROM THE DIRECTOR
OF PUBLIC RELATIONS OF AC SPARK PLUG
DIVISION OF GENERAL MOTORS

COPY

AC SPARK PLUG DIVISION
GENERAL MOTORS

April 5, 1972

Mr. George R. Stamper
U.P.O. 1353
Adult Education
Morehead State University
Morehead, Kentucky 40351

Dear Mr. Stamper:

The results of the research study made several years ago relative to communication problems in industry is not available for public distribution. This was designed to provide answers to problems peculiar to our particular company.

We hope you understand the reason we cannot release this information and hope that you are able to obtain the material you need from other sources.

Sincerely,

Stanley T. Richards
Director of Public Relations

APPENDIX B

CORRESPONDENCE RECEIVED FROM C. D. McDOWELL, PRESIDENT
OF THE HARLAN COUNTY COAL OPERATORS ASSOCIATION

COPY

May 1, 1972

To Whom It May Concern:

Subject: Research study in the area of possible mine
communication problems

The purpose of this letter is to introduce to you Mr. George R. Stamper. Mr. Stamper is a graduate intern with the Appalachian Adult Education Center located at Morehead State University. He is currently working with Dr. Morris L. Norfleet, Vice President, Bureau for Research and Development to identify possible safety problems within the mining industry related to communication.

I have talked with Mr. Stamper and Dr. Norfleet concerning the project and I am quite interested in what they are attempting to do. I wish to request your cooperation in this project as we try to uncover any possible safety problems within our industry--to everyone's benefit.

Cordially,

C. D. McDowell, President
Harlan County Coal Operators
Association
Harlan, KY

CDM:wm

APPENDIX C
CORRESPONDENCE TO THESIS COMMITTEE

COPY

MEMORANDUM

TO: Thesis Committee

FROM: George Robert Stamper

Re: Meeting at the Kentucky Department of Mines and Minerals
at Lexington, Kentucky

DATE: March, 1972

On March 7, 1972, I met with Mr. Harold Kirkpatrick, Commissioner of Mines and Minerals, and his assistant, Mr. J. H. Mosgrove. The following items were the results of that meeting.

Both:

1. were very interested in this project;
2. agreed that the last person to interpret written materials was the general mine foreman;
3. agreed that testing the men in the training class was appropriate;
4. agreed that short written test were the most appropriate form for their men;
5. agreed that I could use the training class to give test if the test were voluntary taken by the men;
6. supplied materials to be tested for readability;
7. supplied materials which contained items to be used in the survey of literature; and
8. recommended that Mr. C. D. McDowell-who could help in securing written materials from mine operators-be contacted through Dr. Norfleet.

cc: Dr. Rose
Mr. Eyster
Dr. Hampton
Dr. Norfleet
Mr. Hyibert

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