Assessing the Readability of Health Education Messages

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IN PREPARING HEALTH MESSAGES for public education, it is difficult to determine if the intended audience will be able to comprehend the message. Readability formulas have been developed to predict the grade level at which a reader can understand a specific message.

A readability formula is a mathematical equation derived by regression analysis. Essentially, an equation is found that best expresses the relationship between a measure of the difficulty experienced by people reading a given text and a measure of the linguistic characteristics of that text. This formula can then be used to predict reading difficulty from the linguistic characteristics of other texts. Of the more than 40 readability formulas avail-

able, some of the more widely used ones are the Dale-Chall Formula, the Flesch Formulas, the Fog Index, the Readability Graph, and the SMOG Grading Formula (1). The following guidelines may be useful when selecting an appropriate readability formula.

Selecting a Formula

To analyze readability one must first select a formula. This decision would be simplified if it were possible to single out the best formula or even rank the formulas by quality. The diversity of the formulas and the materials to which they are applied is too great for such a ranking. Instead, the following guidelines for selecting a formula are offered.

1. Is the formula for general or specialized use? Most of the formulas are appropriate for material intended for a general audience.

However, formulas exist for such specialized material as foreign languages, scientific materials, technical manuals, and primary grades.

2. Is the formula to be applied manually or by automation? Some formulas have been developed specifically for automated use, for example, the Danielson-Bryan Formula. Others, such as the Readability Graph and the SMOG Grading Formula, are designed for easy manual application. This decision depends on the availability of an automated system and on the quantity of work to be analyzed.

3. Is the formula to be used for research or for practical application? A complex formula is necessary only if a user is interested in conducting research. Bormuth's Formulas, for example, are more complex than most because his interest was mainly research. For practical application, a two-variable formula should be sufficient. Generally, a formula in-

cluding a word variable and a sentence variable has high predictive validity. The Flesch, Dale-Chall, Fog, and SMOG Formulas are examples of the two-variable formulas.

4. Does the formula use a list of familiar words? This final guideline may be important for selected users only. As mentioned earlier, several formulas, such as the Dale-Chall, include a count of words that are not on a list of common words. If the word list is lengthy, the user may be discouraged, especially if the analysis is done manually. In addition, for any materials containing a specialized vocabulary (health messages, for example) additions to the word list may be needed to prevent an inflated count of unfamiliar words.

The SMOG Grading Formula, developed by G. Harry McLaughlin, was selected for this analysis because it is intended for a general audience; it can be applied simply and quickly without computers; it is only a two-variable formula; and it does not require the use of a familiar word list. With the SMOG Grading Formula, one can assess the reading difficulty of a passage by counting the polysyllabic words in 30 sentences. Specifically, four steps are involved: (a) count 10 consecutive sentences near the beginning of the text to be assessed, 10 in the middle, and 10 near the end, (b) in the 30 selected sentences count every word of 3 or more syllables, (c) estimate the square root of the total number of polysyllabic words counted, and (d) add 3 to the approximate square root. This gives the SMOG grade, which is the reading grade that a person must have reached if he is to understand fully the text assessed (2).

It takes only about 9 minutes to derive a SMOG grade based on a sample of 600 words.

McLaughlin tested the predictive power of the SMOG Readability Formula with 64 university students (2). Each student read eight 1,000-word passages from various periodicals. Unaided recall was used to measure comprehension. After comprehension scores were controlled for speed of reading, there was a perfect negative rank correlation between polysyllabic word counts and the measures of reading efficiency.

The number yielded by the SMOG Grading Formula should be interpreted as the grade level of education necessary to ensure complete comprehension. For example, SMOG grades 13–16 indicate the need for college education. The standard error of the prediction given by the SMOG Grading Formula is about 1.5 grades. In other words, this formula will predict the grade of a passage correctly within 1-½ grades 68 percent of the time.

SMOG grade of lay publications and patient pamphlets

Publications	SMOG grade	Publications	SMOG grade
Ebony:		**National Cancer Institute's site-subject pamphlet:**	
"A Simple Test for Breast Cancer"	11	Malignant melanoma	11
"How I Cope With Sickle Cell Anemia"	11	Breast cancer	11
"Project Hi Blood"	11	DES (concerned public)	11
"Is There a Male Change of Life"	12	Prostate and male genito-urinary organs	12
Readers' Digest:		DES (public pamphlet)	12
"Say No to Your Children"	9	Skin cancer	13
"What Smoking Does to Women"	12	Hodgkin's disease	13
"Cigarettes—and Sudden Death"	13	Stomach and esophagus	13
"What We Now Know About the Pill"	13	Colon and rectum	13
"Diagnosis: Diabetes"	13	Female reproductive system	13
Ladies Home Journal:		Lung	13
"(en-do-me-tri-o'sis)"	14	Brain and spinal cord	13
"Is Menstruation Really Necessary?"	14	Bladder	13
"Why You're So Tired"	14	Leukemia	14
"What You Need to Know About the New Breast Cancer Therapy Everybody's Discussing?"	14	Non-Hodgkin's lymphomas	14
Time:		Mouth	14
"The Joseph Illness"	12	Pancreas	14
"Kidney in a Suitcase"	13	What you need to know about cancer of the breast	11
"Teddy's Tiny World"	14	**Fox Chase Cancer Center:**	
"The Disease of the Century"	14	Facts about breast cancer	12
Family Weekly:		Mammography: What you need to know	14
"High Blood Pressure: The Silent Killer"	11		
Newsweek:			
"Kids with Cancer"	10		
Washington Post:			
"What You Should Know About Cancer"	15		

The SMOG Grading Formula was used to study the readability of health-related articles in the following lay publications: Ebony, Readers' Digest, Ladies Home Journal, Time, Newsweek, Washington Post, and Family Weekly. These lay publications were compared to numerous pamphlets for patients prepared by the National Cancer Institute and the Fox Chase Cancer Center of Philadelphia.

Results

The table shows that the SMOG reading grade for the lay publications ranged from 9 to 15, a variation requiring from 1 year of high school to almost a college degree to understand the message. The range was smaller for the pamphlets for patients that were assessed. SMOG grades ranged from 11 to 14. Patients who do not have at least 2 years of high school might be ex-

pected to have difficulty understanding the message in these pamphlets.

The nature of an article places different demands on readability. The Newsweek article, "Kids with Cancer," for example, is a feature story emphasizing coping strategies rather than technical explanations; hence, the SMOG grade is lower than that for many of the other articles examined. "High Blood Pressure: The Silent Killer," from Family Weekly (SMOG grade 11), is a more technical article containing factual material, but it is carefully written to avoid unreasonable demands on the reader.

It is probably inevitable that health-related articles will have high SMOG grades because of the technical nature of the subjects. Most medical terms are polysyllabic, thereby inflating the readability estimate. Because of this anticipated

difficulty in communicating health information, educators should be encouraged to routinely assess the readability of their writing. The initial estimates of readability provided in this article can be used as norms to compare with future attempts to produce informative health messages that can be understood by their intended audiences.

References

1. Klare, G. R.: Assessing readability. Reading Res Q 10: 63–102 (1974–75).
2. McLaughlin, G. H.: SMOG grading —a new readability formula. J Reading 639–646 (1969).