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# USING A MODIFIED SMOG IN PRIMARY AND INTERMEDIATE GRADES

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Educators are constantly looking for a simple technique to determine the estimated readability level of a text. The most popular readability technique today is the Fry Graph (1977). McLaughlin (1969), however, developed a technique for establishing a readability score, entitled the SMOG, that is really simpler and quicker than Fry's. Nevertheless, when studies have compared the estimated Fry readability score and the estimated SMOG readability score, it has been discovered that the SMOG score is consistently higher than the Fry score. The assumption made by many educators was that McLaughlin's SMOG score was incorrect. This is not necessarily the case. Fry's readability score is based on 70% comprehension, while the SMOG Grade is based on full comprehension. We should expect the scores to be different. Even if readability formulas were based on the same comprehension percentage, they would not likely yield the same readability score consistently because the factors used in determining the readability scores vary. For instance, Fry uses average number of syllables and average number of sentences in three one-hundred-word samples. Other formulas use word lists, average sentence length, and number of words not on word lists, plus a constant. Readability scores are very likely to vary.

Since educators tend not to use the SMOG Grade because of its variant scores from the Fry Graph, and since the SMOG is so easy and requires no word lists or charts, the author decided to attempt a modification of the SMOG so that it might correlate more closely with the Fry Graph.

McLaughlin (1969) describes the technique for determining the SMOG Grade as follows:

- A. Count 10 consecutive sentences near the beginning of a text, 10 in the middle, and 10 near the end.
- B. Count every word in the 30 sentences having three or more syllables.
- C. Estimate the square root of the number of polysyllabic words counted.
- D. Add 3 to the approximate square root.

It has been the author's procedure in undergraduate reading classes to teach McLaughlin's SMOG but to modify it by changing the constant from 3 to 1. One reason for doing this is that McLaughlin stated that "comparisons show that SMOG Grades are generally two grades higher than the corrected Dale-Chall levels..." (p. 645). After attempting this modification with many books, the author observed that adding 1 to the square root of the number of polysyllabic words produced a readability score similar to that which was determined from the Fry Graph and the Dale-Chall Formula at the upper grade levels. However, many of the modified SMOG Grades were slightly different from the Spache Revised Formula (1974) and the Fry Graph at the primary levels. Observing this pattern, the author decided to carefully examine the SMOG procedure, anticipating modifications that could be made in order to correlate it more closely with other readability formulas at the primary levels.

The Rand McNally Reading Program, (1978), Ginn 720 Reading Program (1976), and Allyn and Bacon's Pathfinder Reading Program (1978) were the texts examined. The readability formulas used for the comparison of primary grade materials were the Spache Revised Readability Formula (1974), and the Fry Graph (1977). For intermediate grades, the Dale-Chall Readability Formula (1948) and the Fry Graph (1977) were used.

It was discovered that two modifications were necessary to make the SMOG Grade useful for primary reading materials. First, McLaughlin recommended that all repetitions of a polysyllabic word be counted. While this procedure is necessary for McLaughlin's original procedure, in the modification, one should count a polysyllabic word only once, no matter how many times it is repeated in the thirty sentences. For example, in the pre-primer, *C. A. Zoo and the Kangaroo*, published by Rand McNally (1978), the word "kangaroo" appeared 52 times in the book and 13 times in the sample. It was the only polysyllabic word in the book. To count the word more than once would have inflated the readability score to an unrealistic level.

The second modification was to eliminate the constant. That is, the estimated readability level of primary grade material is simply the estimated square root of the number of polysyllabic words in the sample. As can be seen in Figure 1, the adapted SMOG Grade compares rather closely with estimated levels from the Spache Revised Formula and the Fry Graph.

Figure 1

Comparison of the Modified SMOG  
with the Spache Revised Formula,  
the Dale-Chall Readability Formula,  
and the Fry Graph

	Agree	1 year difference	2 year difference	3 year difference
Fry	30	8	0	0
Spache Revised	16	6	0	1
Dale-Chall	9	5	1	0

When the obtained square root is 4 or more, a constant of one must be added. That is to say, there is a difference in constants for determining the estimated difficulty level of primary and intermediate grade materials.

In summary, to modify the SMOG to compare more favorably with other readability techniques:

- 1) Count 10 consecutive sentences near the beginning of the text, 10 in the middle, and 10 near the end.
- 2) Count the words of 3 or more syllables in the 30 sentences. (If a polysyllabic word is repeated in the 30 sentences, count it only one time.)
- 3) Round to the nearest perfect square of the number of polysyllabic words counted, i.e., 1, 4, 9, 16, 25, 36...
- 4) Determine the square root of that nearest perfect square.
- 5) If the obtained square root is 3 or less, the modified SMOG Grade will be simply the square root of the polysyllabic words. When the square root is 4 or more, add a constant of 1 to the square root for the modified SMOG Grade. (When one adds nothing to the square root of 3, and adds a constant of 1 to the square root of 4, it is not possible to determine 4th grade material. The author compared fourth grade material with third and fifth grade material and concluded that fourth grade material more closely resembles third grade material than fifth grade material.)

For those people who have difficulty with squares and square roots, Figure 2 will be helpful. All one has to do is count the 30 sentences and the number of polysyllabic words in those sentences (excluding repetitions). In column A, locate the figures between which your polysyllabic word count falls. Then, directly across in column B, your estimated readability level will be given.

Figure 2

Table for Determining Modified SMOG Reading Grade Level

If the number of polysyllabic words is between     (A)    , then the readability level will be     (B)    , grade.

<u>A</u>	<u>B</u>
0 - 2	1
3 - 6	2
7 - 12	3 or 4
13 - 20	5
21 - 30	6
31 - 42	7
43 - 56	8
57 - 72	9
73 - 90	10
91 - 110	11
111 - 132	12
133 - 156	13

While this modification is not a cure-all for estimating readability levels, it works as well as other readability techniques. When one learns the procedure well, estimating level of difficulty of a text can be done even more rapidly than by using the Fry Graph.

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