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THEME ARTICLE

Rethinking Readability Metrics in Medical Communication: Are Common Readability Formulas Still Useful?

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ABSTRACT

Readability is an important quality for medical communicators to consider in crafting information that is clear, easily understood, and enjoyable for any reader to read. Although readability formulas have been developed to help communicators craft readable information, common readability formulas have fundamental limitations that constrain their value. Also, with rapidly advancing technology, common readability formulas may be outdated. This article summarizes what readability really means, why readability is important for all readers, and the benefits and limitations of common readability formulas. This article also discusses how readability metrics might be advanced in the future and how humans will continue to be crucial in filling readability gaps.

INTRODUCTION

The concept of readability was originally defined in the 1920s and progressed in the 1950s.[1] However, over the past 25 years, publications on readability have grown exponentially (Figure 1).[2] This growth suggests a greater recognition of the value of readability, the desire to better understand readability qualities, and the motivation to optimize readability to ensure information meaningfully impacts readers. Yet, commonly used readability formulas have remained the same for decades, raising questions about the usefulness of these metrics for medical communication.

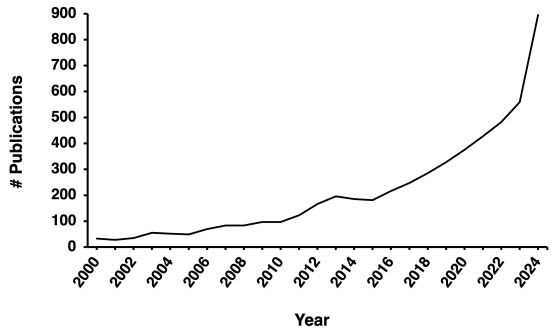

Figure 1. Publications on readability indexed in PubMed have increased between 1999 and 2024. The query was ("readability" [Title/Abstract]), completed on July 15, 2025.

In this article, I describe what readability really means and why readability is important for all readers. I also share the benefits and limitations of common readability formulas that medical communicators must consider in crafting readable content. I also share how readability formulas could advance in the future and why I believe that medical communicators will continue to be crucial in filling readability gaps.

THE ELEMENTS OF READABILITY

By definition, readability is the quality of being easy and enjoyable to read.[3] However, when considering readability, medical communicators may focus their attention on language, legibility (how easily writing can be read based on the visual clarity of the text),[4] or a combination of these 2 characteristics. But readability is much more complex. According to early work, readability comprises 228 elements. These elements can be combined into 4 overarching components: content, style, format, and the organization of ideas.[5] Content refers to the information presented in the text, such as the difficulty of concepts or density of ideas. Style refers to the linguistic elements, such as vocabulary and sentence structure. Format refers to the visual and physical aspects of text presentation (eg, legibility), such as typeface and layout. Finally, the organization of ideas includes the structure of chapters, sections, headings, and paragraphs. These components have different levels of importance, with content being the most important, followed closely by style, then format, and then the organization of ideas.[5]

THE VALUE OF READABILITY

Readability has many notable benefits. For example, readability has been associated with better comprehension and retention.[6,7] Also, better readability implies greater ease of reading for the intended audience and accessibility to a broader audience. This ease of reading can also reduce the time needed to comprehend information and even ask and/or answer clarifying questions. In certain scenarios (eg, clinic visits), these time savings could result in cost savings. For example, when patients clearly understand

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health information, health care professionals might spend less time answering patients' questions or manage fewer follow-up visits or re-hospitalizations due to patients who do not fully understand their condition or treatment plan. Readability can also improve quality of life. Indeed, readability was associated with task performance,[8] meeting information needs,[9] and building confidence[10] in different populations. Most importantly, readability encourages clear communication that supports trust in science, which has been challenged in recent years.[11,12]

Many medical communicators associate readability with health literacy for patients or the general public. Indeed, health literacy is correlated with patient outcomes.[13] Yet, the readability of patient materials is a global problem. In an umbrella review of readability assessment studies, the readability of most patient materials exceeded the recommended reading level by up to 11 grade levels.[14] Also, most peer-reviewed patient education materials published in high-impact medical journals were written at reading levels far above the national recommendations.[15] This finding similarly occurred in studies of patient education materials written for populations in Canada,[16,17] Hungary,[18] and Turkey.[19] Even popular online encyclopedias for health-related information were written at a reading level that is difficult or very difficult to read.[20] This reading difficulty has been linked to several factors, including jargon,[21] that affect a patient's ability to process information. Also, this difficulty can be exacerbated when patients experience stress.[22]

Although readability is an important factor to consider when writing for patients and the public, readability is important for everyone, even scientific and medical experts. On the one hand, experts may have a higher level of education, more specialized experience, and more familiarity with the technical language of a specific field than the general public. On the other hand, experts also juggle stress, busy schedules, and information overload that can all impede their ability to quickly read and make meaning of the information they read.[23] Also, experts may prefer documents that are easier to read, which is supported by studies correlating factors of readability with the number of times a paper was cited.[24] And in my experience, I've noticed that when given the choice, experts—and most people—will choose the easiest way or the path of least resistance. Yet, the readability of scientific texts has been decreasing over time. In 2015, 22% of abstracts in scientific papers were written beyond college graduate level. In 1960, this percentage was 14%.[25] The decline in readability of scientific texts may be related to a number of factors, including jargon,[25] acronyms,[26] or possibly the incentive to inflate the complexity of writing to increase the likelihood of the work being cited.[27] Nonetheless, readability is an important factor to consider for everyone, including scientific and medical experts.

COMMON READABILITY FORMULAS

Over the past century, many formulas have been developed to capture readability levels. Some of the most commonly used formulas include the Flesch-Kincaid Grade Level, Flesch Reading Ease, Automated Readability Index, Coleman-Liau, Gunning Fog Index, Laesbarhedsindex (LIX) Formula, and Simple Measure of Gobbledygook (SMOG) Index. In my experience, I have noticed that many medical communicators use the Flesch-Kincaid Grade Level and Flesch Reading Ease, which are built into Microsoft Word. This built-in feature can give a quick estimate of readability without risking exposure of confidential or proprietary information to an external source. However, the SMOG Index has shown the greatest consistency with written health information.[28]

BENEFITS AND LIMITATIONS OF COMMON READABILITY FORMULAS

Common readability formulas have a number of benefits. For example, these formulas include measurable qualities that give a concrete numerical metric. This metric allows writers to easily estimate the reading level of text to ensure information meets recommended guidelines. Also, common readability formulas are actionable. They can give instant feedback to writers in real time. This instant feedback has also been incorporated into specialized electronic tools that highlight characteristics that contribute to complex writing and even suggest improvements to support real-time editing.

Despite these benefits, common readability formulas have important limitations that medical communicators must consider. First, common readability formulas are inconsistent and can give variable results that differ by 5 or even nearly 13 grade levels.[28,29] In fact, this very sentence returns readability scores that range from a grade level of 11 and 15, depending on the formula used to measure readability (https://storytoolz.com/readability). Second, common readability formulas are not comprehensive and therefore not accurate. These formulas are largely based on only 2 easily measurable contributors to readability: word length and sentence length.[1,30-34] Although these factors are an important part of the style component of readability, they exclude other important components of readability related to style (eg, jargon, prepositions), content, format, and organization of ideas.[5] Third, common readability formulas are based on calculations of textual characteristics that do not factor in reader attributes or directly measure comprehension. For example, they do not factor in logic or "understand-ability." For instance, the sentence, "The patient completed the treatment" has a Flesch-Kincaid Grade Level of 5.2 (for the sake of this argument, only one score is provided). However, the sentence, "The treatment

completed the patient" has the same Flesch-Kincaid Grade Level of 5.2, but the sentence does not logically make sense. Also, common readability formulas do not measure reader's familiarity with a topic, so they do not factor in whether certain technical terms (that may have long, polysyllabic words) are familiar to readers. Further, they do not consider the difficulty of concepts or reader's emotionality, interest level, or engagement in the text. These factors are important for writing readable text that readers can comprehend.[6] Thus, medical communicators must keep in mind the limitations of common readability formulas and not over-rely on them when crafting readable content.

THE FUTURE OF READABILITY FORMULAS

The readability tools that many medical writers have come to rely on were originally developed approximately 50 to 75 years ago—and may be outdated. The Gunning Fog Index was originally developed in the 1950s[1]; the Automated Readability Index, LIX Formula, and SMOG Index were originally developed in the late 1960s[1,32,34]; and the Flesch-Kincaid Grade Level, Flesch Reading Ease, and Coleman-Liau were originally developed in the 1970s.[31,33] This timing was before computers and the internet were widely available, which has shifted the common reading format from print to digital. Indeed, most people seek health-related content on the internet.[35] However, reading digital text has been linked to lower comprehension than paper text, although the results have been inconsistent.[35,36] Even still, the shift from print to digital reading supports that the elements of readability may have also shifted from those outlined in the early readability studies that informed the formulas that medical writers still use today.

Computers have also led to advanced technology that can perform complex calculations in seconds. Thus, the approach of estimating readability based on 2 easily measurable characteristics (word and sentence length[1,30–34]) may be outdated. Several new readability formulas have been proposed (summarized elsewhere[1,37,38]). However, none have been widely adopted, possibly due to the proprietary features of algorithms, the tools not being openly available, or the costs associated with using these tools. As a result, medical writers must consider the limitations and true usefulness of common readability tools and stay informed of advancing technology in this field.

In the past few years, advancements in technology have exploded with the use of artificial intelligence (AI). This technology might be used to develop cost-effective tools that factor in more elements of readability to provide a rapid, more accurate estimate of readability. Indeed, AI has effectively improved the readability of patient-facing materials and enhanced user satisfaction with the material.[39-41] However, the effectiveness of AI in generating accurate, comprehensive, and reliable content was mixed, especially related to complex medical topics.[39,40,42,43] Also, AI showed mixed effectiveness in improving the readability and accuracy of text with different models[41,43,44] and in different languages.[45] Further, AI generated patient education materials with lower readability than that of materials created by humans.[46] These limitations might be addressed in future work with more advanced models and careful engineering of prompts that might even include patient-specific characteristics (eg, primary language, education level, knowledge of the topic).

THE NEED FOR THE HUMAN TOUCH

Readability formulas can provide insightful estimates of the quantitative elements of readability. Also, advances in AI technology may begin to incorporate more qualitative elements, such as format and idea organization, to further refine readability metrics. However, I believe that both readability formulas and AI tools will continue to have limitations that constrain their usefulness and do not renounce the value of humans in crafting readable content.

Most notably, readability formulas and AI tools are calculations and predictability models that lack human consciousness. This consciousness is crucial for crafting information in a way that meets readers where they are and connects with them physically, mentally, emotionally, and intellectually. This connection requires the human touch of medical communicators at both the delivering and receiving ends of communication. At the delivering end, medical communicators can use their expertise to consider the needs of readers, show empathy for them, and help ensure the writing is readable. At the receiving end, medical communicators can enlist support from their intended readers to ensure the information is clear and easy to read and understand.

CONCLUSIONS

Readability is an important factor to consider in ensuring that information is clear, easily understood, and enjoyable for any reader to read. Readability formulas can be helpful in the initial stages of developing communication materials. However, the current formulas are outdated, not readily accessible, and have important limitations that constrain their usefulness. Although future work with advancing technology may improve methods of measuring readability, these tools lack the consciousness needed to overcome the limitations of readability formulas and fully address all the elements that contribute to readability. As a result, the human touch of medical communicators will continue to be needed to consider the limitations of

readability tools and to craft information that meaningfully impacts readers.

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