



## SPECIFICATIONS OF ACCESSIBLE PUBLICATIONS FOR PEOPLE WITH LOW VISION

*Zatserkovnyi R.H., Faculty of Printing and Information Technology,  
Ukrainian Academy of Printing*

*Maik V.Z., Faculty of Printing and Information Technology,  
Ukrainian Academy of Printing*

Modern estimates suggest that there are over 250 million people worldwide with some form of low vision impairment. However, over 90% of all published material is not accessible to people with low vision, leading to a so-called “book famine” of inaccessibility [1]. In order to become accessible to this large audience, such materials have to be published in alternative, accessible formats. This includes Braille books – written in a tactile system of raised dots, rather than printed letters – as well as accessible e-books, audio books and “large print” editions. In an educational environment, however, “large print” books are the only available option, as neither e-books nor audio books may be appropriate for young schoolchildren.

Low vision is a wide spectrum of illnesses, and people with low vision will often have several at the same time. The World Wide Web Consortium (W3C) covers five main categories of vision impairments that negatively affect the accessibility of webpages – to some extent, they also apply to e-books as well as printed material:

- visual acuity – a parameter which indicates the general clarity and sharpness of vision. It can be measured as a fraction of ideal vision, commonly known as “20/20”. Illnesses that negatively impact it often affect the retina;
- light sensitivity – some people with an illness called “photophobia” may experience eye pain, headaches or migraines from looking at bright or reflected light, including light sources which are not normally painful;
- contrast sensitivity – a person with poor contrast sensitivity (and normal visual acuity) may be able to clearly see high-contrast objects, but struggle to distinguish objects with a low difference in contrast;
- field of view – different vision impairments can lead to light or dark spots obscuring a person’s central vision or, inversely, narrowing their visual to a small circular field – so-called “tunnel vision”;
- color perception – some people with low vision lose the ability to distinguish between similar colors, usually because of diseases related to cone cells which are responsible for color perception.

After reviewing related standards for large print publications [2-5] and the above medical conditions, we have identified the following key areas that need to be focused on in an accessible publication:

- *Text size*: all reviewed standards recommend a font size between 16-20 points. Smaller typefaces may be illegible to many readers, and larger ones may require significant changes to the page structure;



- *Font characteristics*: serif typefaces are discouraged, while monoweight and sans serif fonts are recommended – e. g., Arial, Verdana and Helvetica. We can also use “x-height” – the weight of a lowercase letter “x” – to determine whether a typeface is considered appropriate. Typefaces with a tall “x-height” generally appear larger than smaller ones at the same font size;
- *Spacing*: the reviewed standards suggest an increased line spacing, between 120-150% of the type size;
- *Margins*: a standard margin of at least 2-3 cm is needed;
- *Paper quality and background color*: the physical paper itself should have a matte or dull finish, while the page background should use a color other than plain white – like a very light gray, beige, light yellow or eggshell white;
- *Color contrast*: the difference between the light reflectance values (LRVs) of two colors should measure at least 70%, indicating a high relative contrast;
- *Columns and text alignment*: some viewers can read text in full-width format, while others prefer it to be presented in two half-width columns. However, the text within should always be left-aligned, rather than justified. Justified text sacrifices the consistency of text spacing to achieve equal line width, which can create distracting spacing between words;
- *Tables and illustrations*: tables should not be split into multiple pages, and should use bolder lines to clearly distinguish between the cells. Illustrations should be kept to the same page, and must always be accompanied by clear captions on the same page;
- *Other prohibited elements*: besides the aforementioned properties, there are other miscellaneous features that can hinder text accessibility. These include all-capital letters, emphasis via italics or color highlighting and single words or lines dangling from one page to another.

Currently, while much research has been focused on e-books, the same cannot be said about low-vision-adapted publications. Textbooks designed for low-vision readers generally comply with the most common focus areas – large font sizes and alternative page backgrounds are used – but aspects such as color contrast are of equal priority, and tend to be overlooked. A standard incorporating these aspects of publishing, and software to determine a publication’s eligibility based on them, would help increase the suitability of these publications to their intended audience.

#### References

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