Websites Accessibility Options from the Perspective of the Visually Impaired

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In an effort to improve digital accessibility, the European Parliament has mandated the adaptation of public websites and mobile applications for the blind and visually impaired. This study evaluates the accessibility options used on selected public websites from the perspective of visually impaired people and shows that text size adjustment, keyboard navigation and eReader support are the most common options. For eReading, challenges remain in language support, and for PDFs, in content recognition, both of which underline the need for advanced AI solutions. However, colour contrast options are surprisingly less common, indicating a discrepancy between digital and physical accessibility solutions. Features such as link highlighting and dyslexia-friendly settings are less relevant for the visually impaired but benefit other user groups, highlighting the importance of a diverse range of accessibility options. Further research is recommended to determine the optimal colour contrasts and to refine accessibility features based on broader user feedback, with the goal of creating a more inclusive digital environment for all, including those with hearing or mobility impairments.

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Možnosti dostopnosti na spletnih straneh z vidika slabovidnih

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V prizadevanju za izboljšanje digitalne dostopnosti je Evropski parlament odredil prilagoditev javnih spletnih mest in mobilnih aplikacij za slepe in slabovidne. V prispevku z vidika slabovidnih ljudi ocenjujemo možnosti za dostopnost, ki se uporabljajo na izbranih javnih spletnih mestih. Ugotavljamo, da so najpogosteje uporabljane možnost prilagoditev velikosti besedila, navigacija s tipkovnico in uporaba e-bralnike. Pri e-branju je izziv jezikovna podpora, pri datotekah PDF pa prepoznavanje vsebine, pri čemer se kaže potreba po naprednih rešitvah umetne inteligence. Možnosti barvnega kontrasta so presenetljivo redko uporabljene, kar kaže na neskladje med digitalnimi in fizičnimi rešitvami dostopnosti. Funkcije, kot je označevanje povezav in disleksiji prijazne nastavitve, so manj pomembne za slepe in slabovidne, vendar koristijo drugim skupinam uporabnikov. Slednje kaže na pomen raznolikih možnosti dostopnosti. Potrebno bo najti optimalne barvne kontraste in izboljšati funkcije dostopnosti na podlagi obsežnejših povratnih informacij uporabnikov, da bi ustvarili še bolj vključujoče digitalno okolje.

1 Introduction

Accessing information and public services from the Internet has become an integral part of daily life, facilitated by the use of stationary and mobile devices. This constant availability transcends time and location constraints. The only condition is the availability of the network. While obtaining information and utilizing public services is typically seamless, challenges emerge when considering individuals with special needs. Owing to their unique circumstances and limitations, it is imperative to incorporate this demographic into the framework of accessible information and services, providing tailored accessibility solutions.

In 2016, the European Parliament addressed this issue by adopting a directive on the accessibility of websites and mobile applications for public sector bodies (Csontos & Heckl, 2021). The aim is to enhance access for all European Union citizens, particularly those with special needs (Accessibility of public sector websites and mobile apps, 2021). Guidelines for accessibility were developed by Kirkpatrick, O'Connor, Campbell & Cooper (2023), encompassing a diverse group, including individuals who are blind or visually impaired, deaf or hard of hearing, or who have physical disabilities, speech disabilities, cognitive impairments, sensitivity to photographs, or a combination of these. The accessibility options are categorized as A, AA, and AAA levels, with the latter indicating greater success in terms of website accessibility.

2 Accessibility Quality Assessment

The primary objective of incorporating accessibility options is to empower individuals with disabilities, ensuring they can access information from the Internet in a user-friendly and accessible format. The significance of this accessibility is particularly pronounced when it comes to information from public authorities and websites within the public sector (Konvencija o pravicah invalidov, n.d.). This includes crucial areas such as employment, education, banking, health services, and other online economic services, where individuals with disabilities should have equal access to submit applications (Lewthwaite and James, 2020).

In essence, the emphasis lies not on the specific website utilized by individuals with disabilities, but rather on the paramount importance that the website itself be designed and maintained to be fully accessible to this demographic.

The basic criteria for accessibility are as follows:

- level A: keyboard accessibility, use of audio, pausing of video content, possibility of using colours, alternatives to text content, setting of font size and format as well as the possibility of spacing and alignment of the font,
- level AA: Audio subtitles for live recordings, audio descriptions for recorded video content, contrast, navigation, logical sequence of content, clearly labelled titles, and
- level AAA: audio description, sign language interpretation for audio or video content and no time limit (Kirkpatrick, O Connor, Campbell & Cooper, 2018; Accessibility of public sector websites and mobile apps, 2021).

Level A represents the fundamental requirements essential for a website to achieve accessibility, serving as the foundation for inclusivity. Failure to meet these criteria renders the website entirely inaccessible (Introduction to Web Accessibility, n.d.). At this level, key provisions include text alternatives for non-text content, pausing video content, accommodating colour usage, ensuring sound usage is compatible, and facilitating keyboard navigation (Kumar, Divya Venkatesh & Biswas, 2021).

Moving to Level AA, the focus is on addressing the major barriers faced by individuals with disabilities. At this stage, the most significant accessibility challenges (Introduction to Web Accessibility, n.d.) should be eliminated. Level AA necessitates meeting Level A requirements while incorporating additional features such as audio subtitles in live recordings, audio descriptions, text contrast, and text resizing (Kumar, Divya Venkatesh & Biswas, 2021).

The AAA level represents the highest tier, posing greater challenges for websites to attain. Although reaching this level is desirable, it is not mandatory. Lorca, de Andrés, and B. Martínez (2018) propose that a website achieving all accessibility options at the AA level, with only one at the A level, would receive an A rating.

2.1 Accessibility and customization options

2.1.1 Keyboard accessibility

Keyboard accessibility implies that users can navigate the website solely using the keyboard, eliminating the need for a mouse. It is important that the website be clearly designed, transparent and follow a logical sequence. The keyboard focus should be evident, ensuring users are aware of their location within the interface (Making the Web Accessible, 2022; Accessible Technology, 2022). If the website has this accessibility option, it has achieved level A, and if there is no time limit on when the user has to press the button, it has achieved level AAA (Kirkpatrick, O Connor, Campbell & Cooper, 2018).

2.1.2 Navigation

The drop-down menu or navigation is an accessibility option ensuring that the data is organised and collected in a meaningful way. It is important that the headings and subheadings are written in a hierarchical and meaningful way. Employing visual cues such as underlining or bold text enhances clarity. Additionally, differentiating colours for headings and subheadings upon clicking aids users in recognizing visited or viewed content (Accessible Technology, 2022; Radovan & Perdih, 2016). It is also important that we can move freely while navigating and do not have to go from word to word and that the content below the navigation does not remain visible (Making the Web Accessible, 2022). Navigation reaches level AA when it always appears in the same order (Kirkpatrick, O Connor, Campbell & Cooper, 2018).

2.1.3 Font customization

There are two options for customising font: font type and format and font size. The most common font size on websites is size 12, and the user should be able to increase this further. For the font, the user can choose between three fonts: Times New Roman, Arial and Helvetica. These fonts are not decorated, so they are easier for the user to read (Radovan & Perdih, 2016). The website reaches AA level if the font, images and text do not overlap when enlarged. However, if the website has the option to remove parts of the content, the title names achieve level AAA. Part of

the content is removed to make it understandable for people with limited cognitive abilities (Kirkpatrick, O Connor, Campbell & Cooper, 2018).

2.1.4 Colour customization

Including colour choice among the accessibility options is essential, allowing users to customize both font and background colours based on individual preferences. This feature elevates the website to the highest accessibility level, AAA. In the event that the website already has pre-selected colour contrasts, it achieves the AA level (Accessible Technology, 2022). It is recommended that colour contrasts in pastel colours be proposed in advance (Making the Web Accessible, 2022).

2.1.5 Text Spacing & Alignment

For the AA standard, it is recommended that line spacing should be set at least 1.5 times the font size. Similarly, spacing between paragraphs should be twice the font size, according to accessibility guidelines (Making the Web Accessible, 2022). Adequate line spacing significantly improves readability and reduces the likelihood of letter confusion for users (Radovan & Perdih, 2016).

In addition, according to the AA standard, letter spacing should be at least 0.12 times the font size, and word spacing should be 0.16 times the font size (Making the Web Accessible, 2022). These specifications contribute to an inclusive and user-friendly design that accommodates a diverse range of users.

2.1.6 Link Tags

Within the website we can also see various links. If the content is out of context and it would be beneficial for the user to learn something about it, it would be useful to be able to click on it. It is important that links to new information be visually highlighted, can be coloured, have an additional character or take a different form (Making the Web Accessible, 2022). The website reaches the AAA level when the link is in context with the text - it is complementary (Kirkpatrick, O Connor, Campbell & Cooper, 2018).

2.1.7 Switch off animations and flashing effects

A website that contains no flashing content achieves level AAA. Level A is achieved when the flashing content is dimmed and limited to a smaller area (Accessible Technology, 2022). It is recommended that users have the ability to control moving content, such as videos, advertisements, scrolling sources, etc. The easiest strategy for websites is to avoid such content (Making the Web Accessible, 2022).

2.1.8 Audio and video content

Video content that is accompanied by a description below the image achieves accessibility level A. The exception is live video content with subtitles, which achieves level AA. For the highest accessibility level, AAA, sign language interpretation is required (Kirkpatrick, O'Connor, Campbell, and Cooper, 2018). To improve the user experience for both audio and video content, creators are advised to use high-quality microphones and recording software, ensuring cleaner recordings free from background noise.

If background noise or music is incorporated, it should be at least 20 decibels quieter than the spoken content in the foreground. In addition, the background elements should not contain repetitive patterns and high-pitched sounds. The speaker in the foreground should deliver the content clearly and deliberately and at a moderate pace. Topics should also include pauses so that users have time to process the information (Kirkpatrick, O'Connor, Campbell & Cooper, 2018).

3 Blind and visually impaired

The predominant way of presenting information and services online is through written content such as descriptions, instructions and links. However, this format presents a significant barrier for people with visual impairments or blindness. To overcome this challenge, it is important to make customised accessibility adaptations based on each person's level and type of impairment.

3.1 Degrees of blindness and visual impairment

People with visual impairments are categorised as blind and visually impaired. The degree of impairment depends on how much information they can take in with the help of their vision (Albrecht et al., 2016). The boundary between visual impairment and blindness, regardless of visual acuity, is a visual loss of 95% or a visual field narrowed by less than 10 degrees around the fixation point. Normal visual acuity is 100% or 0.1. When determining whether a person is blind or visually impaired, the visual acuity of the better eye is taken into account in order to achieve a better correction (Okvare vida, 2022). It is a mistake to believe that only people who are completely visually impaired are classified as blind. We also classify people with residual vision of up to 5% as blind. However, such low residual vision does not enable people to orient themselves independently (Okvare vida, 2022).

Visual impairments (2022) are categorised according to visual acuity:

Visual impairment:

Category 1: visual acuity from 0.3 to 0.1
Category 2: Visual acuity of less than 0.1 to 0.05, or a restricted field of vision around the fixation point of 20 degrees or less, regardless of visual acuity.
Blindness:
Category 3: A visual acuity of less than 0.05 to 0.02 – or a field of vision around the fixation point restricted to 5-10 degrees, regardless of visual acuity.
Category 4: A visual acuity of less than 0.02 - or a restriction of the field of vision around the fixation point to up to 5 degrees, regardless of visual acuity.
Category 5: visual acuity 0 – Light perception is negative.

3.2 Types of visual impairment

3.2.1 Myopia and hyperopia

Near-sightedness or myopia is a visual impairment in which people have difficulty seeing things at a distance. People with this visual impairment see objects in the distance blurred (Central Vision Loss: Causes, Diagnosis, and Treatment Options, 2022). Farsightedness, or hyperopia, is a visual impairment in which people have

difficulty seeing things up close. Objects viewed up close by a person with this visual impairment appear blurred and distorted. What both types of visual impairment have in common is that those affected can receive help from glasses or contact lenses, in some cases with surgery (Accessible Technology, 2022). Damage to the macula, which is essentially related to the ageing process, can lead to a deterioration in visual acuity (Refractive Errors, 2022). ADM often occurs in older people but does not lead to complete blindness. However, the loss of vision can make it difficult to look at faces, read, write, drive, cook and clean the house (Refractive Errors, 2022; Eye Diseases & Conditions, n.d.).

3.2.2 Strabismus

Visual impairments also include squinting or strabismus (Common Eye Disorders and Diseases, 2022). Strabismus is a term for eyes that are not properly aligned, which can lead to double vision and blurred vision (Eye Diseases & Conditions, n.d.). Strabismus can cause the eyes to turn inward or outward. This is due to a lack of coordination between the eyes. The brain can learn to ignore one of the eyes, which in turn can lead to permanent loss of vision in that eye (Common Eye Disorders and Diseases, 2022).

3.2.3 Cataracts

Cataracts prevent or block light from entering the eye in one or both eyes. Vision may become blurred or cloudy, and double or ambiguous vision may occur. People with cataracts may also see a yellowish spot in the pupil (Eye Diseases & Conditions, n.d.). There are varying degrees of visual impairment in cataracts, which leads to impaired quality of life (Abuaddous, Jali & Basir, 2016).

3.2.4 Diabetic retinopathy

Diabetes mellitus is on the rise worldwide, and it is predicted that the number of diabetics will increase to 439 million adults worldwide by 2030 (Afarid et al., 2022). Diabetic retinopathy can occur in people with diabetes. Diabetic retinopathy is a common complication of diabetes. It is characterised by progressive damage to the blood vessels of the retina. Diabetic retinopathy progresses through four stages – from mild to moderate and severe to the most advanced stage (Common Eye

Disorders and Diseases, 2022). Symptoms that sufferers may not notice until later include blurred vision, floating spots, sudden loss of vision in one eye, flashing lights, poor night vision and colour vision (Eye Diseases & Conditions, n.d.).

3.2.5 Glaucoma

The next form of visual impairment is glaucoma or green cataract. Glaucoma is a serious, lifelong eye disease that can lead to vision loss and blindness due to damage to the nerves at the back of the eye (Refractive Errors, 2022). However, glaucoma does not necessarily lead to blindness as it can be controlled by modern treatments (Eye Diseases & Conditions, n.d.). Because glaucoma is asymptomatic at first, half of people do not even know they have it. Over time, however, it can lead to a slow loss of vision, usually in the area by the nose (Refractive Errors, 2022).

3.2.6 Amblyopia and colour blindness

Amblyopia, also known as lazy eye, is a form of visual impairment that occurs when the vision in one eye deteriorates because of a lack of coordination between the eye and the brain. Over time, the brain tends to rely more on the stronger eye, leading to a gradual weakening of vision in the affected eye (Refractive Errors, 2022). Typically, amblyopia manifests itself in one eye, more rarely in both eyes (Common Eye Disorders and Diseases, 2022).

Colour blindness, or the absence of colour vision, encompasses various problems that people may have in perceiving colours (Eye Diseases & Conditions, n.d.). In addition, there is a particular condition that involves degeneration of the retina and is classified as a rare eye disease. This disease is characterised by the gradual breakdown of retinal cells, resulting in vision loss. It is important to note that this visual impairment is genetically inherited, i.e., those affected are born with this disease (Refractive Errors, 2022).

3.2.7 Central and peripheral visual field defect

Visual field defects are also one of the most common visual impairments. There are two types of visual field loss: central and peripheral. Central visual field defects affect near vision and peripheral visual field defects affect distance vision (Visual field

defects: causes, treatment and help, 2023). Peripheral visual field loss occurs when a person can only see objects that are directly in front of them. The person can only see what is in the centre of the visual field, but not everything around it (Griff, 2020). Central vision accounts for only 3% of the total visual field, but is important for recognising the details of objects and judging distances (Central vision loss: causes, diagnosis and treatment options, 2022).

3.3 Accessibility of selected public websites

Based on the accessibility assessment guidelines and the most common needs of blind and visually impaired people, we have selected three websites that offer different accessibility options but at the same time differ in their objectives. We selected the following websites: Maribor Pharmacies, the Municipality of Maribor, and the Pension and Disability Insurance Institute of Slovenia. The selection is based on the significant number of options for accessing and offering public information that is important for all citizens. We have also included pages with content specifically intended for the blind and visually impaired, such as the Association of Blind and Visually Impaired Societies of Slovenia, the IRIS Centre, and the Institute for Blind and Visually Impaired Youth Ljubljana.

3.3.1 Website of the Municipality of Maribor (Mestna občina Maribor)

The website of the Municipality of Maribor is characterised by its sophisticated design and comprehensive range of information. The website skilfully presents a wealth of data without overwhelming the user, ensuring a well-organised and user-friendly experience. The introductory video showing the Maribor city administration can be paused, which is rare for most websites. The headings are clearly visible, as they are enlarged and in bold font. Also interesting is the use of icons that can be used instead of text. This clearly explains the content that may be of interest to us. If we want to click on them, they are outlined in red. The links we want to click on are also red. The lack of live audio and video content does not detract from the quality of the website. Instead, the available multimedia content is subtitled and accompanied by sound.

The website offers various accessibility options such as text zoom, contrast, text spacing, stop animations, text alignment and line height adjustment. It also includes accessibility features such as changing the cursor, highlighting links, screen hinting and colour saturation, which, although not explicitly listed in the evaluation criteria, are consistent with established guidelines and are increasingly recognised as essential components of accessible design.

3.3.2 Maribor Pharmacies (Lekarne Maribor) Website

The website of Maribor pharmacies is very diverse, as it offers a great deal of information at once. Since it is a website where most of the products are sold, the content is also effectively enriched by visual material. Headings and subheadings are bold and clearly labelled. Under the accessibility options, we have two options to increase or decrease the font size, either by clicking with the mouse or by using the keyboard. In the options we also find a colour scheme that is very vivid, although most of the recommended colours are pastel contrasts.

Finally, we can choose between different fonts, and among the options for different fonts we also find a dyslexia aid. In general, you could say that there are not many accessibility options on this website, and that's not a bad thing. However, in such a case, the accessibility options must be of high quality, perfected and chosen wisely.

3.3.3 Website of the Pension and Disability Insurance Institute of Slovenia (Zavod za pokojninsko in invalidsko zavarovanje Slovenije)

At first glance, the website of the Slovenian Pension and Disability Insurance Institute is quite diverse, as it offers a wide range of information. This is because the website has no navigation, i.e., if we want to know more about the content, we simply click on it. It is therefore understandable that the website offers all the information at once. The headings are clearly visible and in blue or white. We can also click on them. You could say that they have replaced accessibility with "highlight links."

The website also has an eReader and a sign language function. With the eReader, we can choose between three readers: two female voices and one male. The interpreter presents the content in sign language. This also includes subtitles. In total, there are

42 recordings that offer sign language. At the same time, the website has other accessibility options, such as a choice of font size, font type and colour scheme. With all three options, the user can choose from more options than with most other sites.

4 Methodology

In this study, as a first step, three websites were selected to be evaluated by blind and visually impaired individuals. These websites were selected based on their compliance with the accessibility guidelines recommended by the World Wide Web Consortium (W3C) as described by Kirkpatrick, O'Connor, Campbell, & Cooper (2018). The aim was to evaluate websites with different levels of accessibility: one with poor accessibility, one with satisfactory accessibility, and one with good accessibility. However, after reviewing the literature and guidelines, this approach was deemed ineffective. It was therefore decided to examine three websites, all of which were considered to have good accessibility but differed in their offerings. The main criterion for selecting these websites was the variety of accessibility options they offer. Despite the diversity of their accessibility features, the websites differed from each other as they offered different types of accessibility support. A third criterion was the relevance of these websites to blind and visually impaired users, including websites related to community services, healthcare and social issues.

4.1 Purpose

Based on the selected websites of public service providers, the aim of the study is to create a list of these options and to determine which accessibility options are actually meaningful and useful from the perspective of blind and visually impaired people. We asked the following research questions:

1. Which accessibility options are most commonly used by blind and visually impaired people?
2. Which accessibility options most benefit blind and visually impaired people?
3. Which adaptations are of less benefit to blind and visually impaired people?
4. What new accessibility options would you like to see?

4.2 Data collection

We reviewed the websites of public service providers that offer the widest range of accessibility options. These included the websites of Maribor Pharmacies, the Municipality of Maribor and the Pension and Disability Insurance Institute of Slovenia. We selected a number of adaptations and assessed which adaptations were appropriate and useful based on the opinions of blind and visually impaired people. For data collection, we chose an online questionnaire, which was provided to respondents with the help of specialised institutions for the blind and visually impaired and via the e-mail addresses of personally known blind and visually impaired people.

The evaluation of websites was carried out by visually impaired participants in the sample.

4.2.1 The description of the instrument

The questionnaire began with the respondents being familiarized with the purpose of the study in the introduction and assured of anonymity. The first part of the questionnaire contained questions about gender, age and information about the respondent's visual impairment. This was followed by instructions on how to rate websites, emphasizing that ratings should be given from the perspective of personal experience with the accessibility options of the website in question. Respondents visited the website via the link provided. For each website evaluated, two sets of questions were prepared relating to the usability of the website for visually impaired individuals and the evaluation of the accessibility options implemented.

In the usability section, the clarity, readability, text spacing, text alignment, appropriateness of colours, functionality of links, navigation, possible animations, visibility of the accessibility options button, and assessment of suitability for visually impaired people were evaluated.

In the section on evaluating accessibility options, the questions focused on evaluating the usability of accessibility features, specifically colour schemes and contrast, font, font size, text spacing, control over animated content, visibility of links, text alignment, availability and quality of eReaders, and mouse pointer size

adjustment. We then provide a list of accessibility options used by visually impaired users so that we could determine which options are frequently or rarely used.

4.3 Sample

The sample comprises 50 blind and visually impaired people in Slovenia. The age structure of the sample includes people aged 21 to 30 years (32%), people aged 31 to 40 years (26%), people over 51 years of age (22%), people aged 41 to 50 years (16%), eight people aged up to 20 years (2%). The sample is gender-neutral. The data collected was processed using the SPSS programme. We used basic descriptive statistics and selected non-parametric tests.

5 Results

5.1 Using accessibility options

Websites offer various accessibility options that do not benefit visually impaired and blind people equally or are used infrequently. Table 1 shows the frequency of use of accessibility options as reported by blind and visually impaired people. Only valid responses were considered.

Table 1: Use of accessibility options

Accessibility options	f	f %
Adjustment of text size	12	38.7
Automatic reading of texts (eReader)	7	22.6
Keyboard only (do not use mouse)	6	19.4
Contrast and colour palette	3	9.7
Highlighting of links	1	3.2
Pointer size	1	3.2
Text spacing and alignment	1	3.2
Total	31	100.0

According to blind and visually impaired people, the most common accessibility option is the ability to change the size of the text; in this case blind and visually impaired people increase the size. The result is not surprising, as we know that blind and partially sighted people often enlarge the text on their phone or computer. In practice, we also find that some people use lenses even though the text on the phone or computer is already magnified. Magnifiers are also used when reading books,

magazines and newspapers, but for some people magnifiers are insufficient. Radovan & Perdih (2016) found that blind and visually impaired people do not use font sizes smaller than 12.

This is followed by the customisation option with the option to read the text or the eReader widget. This is an accessible option where a voice reads the text out loud. It is one of the options that benefits blind and visually impaired people the most and makes it easier for them to access information, but unfortunately it is rarely available. Accessible Technology (2022) has described this accessibility option as an alternative way of obtaining information.

The accessibility option, which allows navigation using only the keyboard without relying on a mouse, is the third most frequently used adaptation. It is recognised by various authors (Making the Web Accessible, 2022; Accessible Technology, 2022) as one of the most important adaptations for blind and visually impaired people, and its effectiveness depends on the logical arrangement of the website design. Designers must take special care to ensure that frames are used effectively. Frames around images, titles or links provide effective guidance. Alternatively, various design solutions, such as changing the colour of text, using signals, or using other unique markers, can serve the same purpose. This accessibility option is particularly valuable, as it not only helps keyboard users but also provides visual cues to mouse users, improving the overall user experience. However, the relatively low frequency of use is notable, since blind and visually impaired people often face problems navigating websites.

Contrast and colour-changing options are common in physical environments but are rarely used by blind and visually impaired people when it comes to digital interfaces. This unexpected result may stem from the challenges associated with the differences between the screen and the physical environment, including potential issues with colour intensity or palette. In addition, the complicated relationship between colours and contrasts can make it difficult to concentrate. When comparing the use of color-coded markings in public spaces, city centres, schools and facilities for people with special needs with the limited use of similar options in digital environments, the reasons for this discrepancy could be complex. These could include potential challenges in effectively replicating contrast strategies in the real world on digital platforms.

Table 2: Use of accessibility options according to the degree of visual impairment

	Type of visual impairment		
Accessibility options	**Impaired**	**Blind**	**Total**
Highlighting of links	1 (5.3%)	0 (0.0)%	1 (3.2%)
Adjustment of text size	8 (42.1%)	4 (33.33)	12 (38.7%)
Pointer size	1 (5.3%)	0 (0.0%)	1 (3.2%)
Text spacing and alignment	1 (5.3%)	0 (0.0%)	1 (3.2%)
Contrast and colour palette	2 (10.5)	1 (8.3%)	3 (9.7%)
Keyboard only (do not use mouse)	3 (15.8%)	3 (25.0%)	6 (19.4%)
Automatic reading of texts (eReader)	3 (15.8%)	4 (33.3%)	7 (22.6%)
Total	19 (61.2%)	12 (38.7%)	31 (100.0%)
χ^2=4,407, df=7, p>.05.			

The table shows the results of the most frequently used accessibility options depending on the degree of visual impairment. There are no statistically significant differences between the categories (P = 0.625) in the use of the accessibility option, indicating that the frequency of use of the option is independent of the degree of visual impairment. There are differences only for certain accessibility options. The table shows that more visually impaired people (42.1%) than blind people (33.3%) use the option to change the text size more frequently. We expect this to increase. The eReader option is the second most frequently used option, used more often by blind people (33.3%) than by visually impaired people (15.8%).

A comparison of the two most frequently used accessibility options yields the expected result. It is easier for visually impaired people to read enlarged text, while audible information is more helpful for blind people. The fact is that blind people, even those with low residual vision, find it difficult or impossible to read the text, while hearing makes this task much easier for them.

Both blind and visually impaired people make equally frequent use of the option to use only the keyboard without using the mouse at the same time. This shows that both categories of people benefit equally from this accessibility option.

The table shows the accessibility options that are used only by visually impaired people. These are changes to the colour scheme/contrast, highlighting links, cursor and text spacing. The option to change the contrast is used only by a blind person, which leads us to the conclusion that this case involves a person with some residual

vision. The significance of the result is limited, as we cannot assume that this option is only used by blind people because of the small sample.

From the results, we conclude that regardless of whether a person is blind or visually impaired, similar accessibility options are used. This basically makes sense because there is a small difference in the percentages of people depending on their level of visual impairment. But at the same time, these percentages are very important for visually impaired and blind people. As Albrecht et al. (2016) stated, blind and visually impaired people perceive the environment differently, from which we conclude that they also perceive the web differently, since people with very low residual vision have difficulty orienting themselves (Okvare vida, 2022). On this basis, we can better understand why the difference is statistically significant.

5.2 Least used accessibility options

As the range of accessibility options is extensive and is not exclusively aimed at blind and visually impaired people, we were interested in which accessibility options blind and visually impaired people use less frequently. Blind and visually impaired people state that they use the following accessibility options less frequently:

- the text alignment setting.
- the line height settings,
- the option to change the mouse pointer/cursor,
- the option to highlight links,
- the screen tip option,
- the dyslexia-friendly option,
- the option to interpret information in sign language

We note that blind and visually impaired people do not benefit from a different font, although the literature claims that the dataset should be left-aligned. Even the possibility of adjusting line height does not help these people to read, as one would otherwise expect. Changing the mouse pointer only confuses blind and visually impaired people, as they first have to change the shape of the mouse pointer before they can use it. However, this change is not so important as to make a further contribution to accessibility. We were very surprised that one of the rarely used

options is the option to select links. The latter option allows a blind or visually impaired person to quickly recognise links that lead to another website. When you select a link, a new online window usually opens, which is unfavourable for blind and visually impaired people. Better visibility of the link would therefore prevent unintentional switching to another website. The ScreenTip for the blind and visually impaired is more of a nuisance than an advantage and distracts attention with its appearance, because when this option is used, a box opens showing what content will appear when the user clicks on it. It is therefore not surprising that this accessibility option is rarely used. Dyslexia-friendly options and the interpretation of information in sign language are not intended for this group of people in terms of functionality alone and are therefore used infrequently or not at all.

Despite the fact that blind and visually impaired people do not use some accessibility options, these cannot be removed from the set. In addition to blind and visually impaired people, websites are used by other people with special needs, so these accessibility options are easier for them to use. Therefore, we believe that every group of people with disabilities deserves research in the field of accessibility options and that in practice, it should be directly investigated which accessibility options benefit a particular group and which do not. Only on the basis of research and results can various accessibility options be added or restricted.

5.3 Suggestions for new accessibility options

When asked for suggestions for new accessibility options, the majority of blind and visually impaired participants (76%) did not respond. This includes those who did not complete the questionnaire and those who skipped the question. We believe that they either had no suggestions or overlooked the question.

Of the valid responses, 8% of respondents chose the "I do not know" option, while the rest suggested the options listed below or wrote comments:

- Direct links to forms
- Proper page structure
- Websites must be edited according to the WCAG standard
- Linguistic search engine on the website

- Short description of hover images
- Complete deactivation of animation and advertisements
- Search fields should work everywhere
- "If the website has been created with accessibility in mind, no additional options are required. Every user has the tools they need. Otherwise, you would not be able to reach the website at all."
- "Blind users have very different needs and are the most vulnerable group when using the internet."

6 Discussion

In the general effort to maximise accessibility at all levels of life and activity, we often forget the more vulnerable or overlooked groups. One such group is blind and visually impaired people, who want to integrate into society like everyone else and are social beings who crave contact. Websites are one way of keeping in touch with them. Recognizing the importance of ensuring inclusion, the European Parliament has taken an important step by adopting a directive dealing specifically with the accessibility of websites and mobile applications for public institutions. The main aim is to facilitate access to public information for blind and visually impaired people, but in a broader sense it is also about contributing to their general integration into society.

In an effort to be more inclusive, various accessibility options have been introduced on selected public websites to improve usability for blind and visually impaired people. To fully understand the effectiveness of these options, we conducted a survey in which we asked the target group for feedback on their perceived usefulness. The results show that the option to change the text size is the one most frequently used by blind and visually impaired people.

This is closely followed by options that allow navigation using only the keyboard, and the electronic reading of selected texts with an eReader. Of particular note is the widespread use of text readers on mobile phones, with the Talkback application being the preferred choice on Android devices, while iOS devices offer a built-in option in the settings.

Despite these advances, there are still issues with using electronic text-to-speech options. Since the Slovenian language is not supported, users opt for Slovak because of its perceived similarity, mainly because it reads the letters -č, -š and -ž correctly. In addition, there are limitations in recognising content in .pdf documents and image recognition; notably, . jpg files remain a challenge. To solve these problems, not only technical limitations need to be addressed, but artificial intelligence solutions need to be explored to improve the overall efficiency of electronic text readers for blind and visually impaired people. The discrepancy between the accessibility options desired and those actually offered was also evident in the study of Hungarian public websites. Nevertheless, the results showed that an accessible website for people with special needs must include a font size of at least 12, the possibility of audible display of image content, correctly aligned text and a link to the same website displayed only once in the text content (Csontos & Heckl (2021). Accessible Technology (2022) from the University of Washington has provided an overview of current accessibility options and suggests the most important features of websites, including: working links, the ability to navigate the website using a keyboard, the organised structure or form of the website.

Accessibility options that are rarely used by blind and visually impaired people include the ability to highlight links, adjust the height of the bar, change the mouse pointer and highlight links. Options that are not used by blind and visually impaired people include the dyslexia-friendly option and the ability to interpret information in sign language, which is understandable and expected given the specifics of both disorders. Although these two accessibility options are not used by this group of people with special needs, there are other groups with special needs who benefit from these accessibility options and cannot be excluded from the range of options available on websites.

Surprisingly, however, it has been shown that the option to change the colour contrast is rarely used. This is a solution that we encounter all the time in everyday life. When we visit public facilities, city centres and schools, as well as kindergartens for children with special needs, we see different coloured floor markings, coloured markings on the stairs, colour-coded fences and other solutions that facilitate orientation. Given the rare use of options related to colour schemes and contrasts, the question arises as to what purpose is served by those colour markings on the

floor, glass surfaces, fence supports, etcetera? Based on our experience, we believe that possible answers to this question could be as follows:

The computer screen represents a much smaller area compared to public areas, and therefore the colour contrast in this case is not helpful for the orientation of blind and visually impaired people.

Perhaps the colours and contrasts are less suitable from the point of view of blind and visually impaired people, and stronger contrasts or pastel colours should be used. We are all constantly surrounded by a variety of content at every turn. This content only makes it more difficult for blind and visually impaired people to concentrate, which is particularly noticeable in the case of animation on websites, since the screen is smaller and animation is perceived even faster. The computer is an aid that is already crucial for blind and visually impaired people in everyday life, but it is not necessary for primary independence.

The results of the study coincide with the conclusions of the author Hrežo (2022), who points to the collaboration between people with special needs and web content developers. All with the aim of gaining a better insight into the necessary accessibility options for a particular website or websites. The author also emphasizes the importance of raising awareness of the issues that people with special needs face when it comes to digital accessibility.

7 Conclusion

The range of accessibility options is extensive, but not all options are equally useful or sensible from the point of view of blind and visually impaired people. This is because the accessibility of websites should be ensured not only for blind and visually impaired people, but also for people with other types of special needs and difficulties. This is particularly so for people with hearing impairments and people with specific motor impairments that make it difficult or even impossible to use haptic devices to interact with the computer.

The results of the study, together with the answers to the research questions, open up new research questions and opportunities for research. It would be useful to determine the contrasts and colours that are most helpful for blind and visually

impaired people and to define these as standard based on the results. The small sample size also shows the need to broaden the scope of the research and obtain more accurate information. Data collected based on a larger sample would show which accessibility options blind and visually impaired people use the most. This would encourage their improvement and development and the abandonment of options that are rarely used. At the same time, this would limit the choice of options and make it easier for people to decide.

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