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Usability assessment and assistive technology for visually impaired servers at the Pernambuco Court of Justice

Avaliação de usabilidade de tecnologia assistiva por servidores com deficiência visual do Tribunal de Justiça de Pernambuco

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A B S T R A C T

Accessibility for people with visual impairments is of vital importance for them to exercise their citizenship. An adapted work environment, which makes assistive technologies (TA) available, helps people with visual impairments to perform their tasks more efficiently, allowing them to exercise their potential and compete with equal opportunities. Limiting the individual for being a visually impaired person is a barrier that needs to be eliminated. Since 2001, the Pernambuco Court of Justice (TJPE) has in its staff of clerks, people with different types of visual impairment. Therefore, and within this context, the present work aimed to evaluate the usability of assistive technologies by TJPE workers who have visual impairment. To this end, a survey was carried out with a questionnaire using Google Forms® to find out the opinion of these servers on the topic addressed. Of the total population of 49 people, 26 effectively answered the questionnaire. The present work was approved by the TJPE and was evaluated and approved by the Research Ethics Committee of the University of Pernambuco (UPE), under CAAE nº 52755021.2.0000.5207. The results obtained showed that there are initiatives regarding the inclusion of the visually impaired person in the TJPE; however, a process of continuity and consistency in the actions regarding the use of TA was not perceived.

R E S U M O

A acessibilidade para pessoas com deficiência visual é de vital importância para que ela exerça sua cidadania. Um ambiente laboral adaptado, que disponibiliza tecnologias assistivas (TA), ajuda a pessoa com deficiência visual a executar suas tarefas com mais eficiência, permitindo exercer sua potencialidade e competir com igualdade de oportunidades. Limitar o indivíduo por ser pessoa com deficiência visual é uma barreira que precisa ser eliminada. Desde o ano de 2001, que o Tribunal de Justiça de Pernambuco (TJPE), tem em seu quadro de serventuários, pessoas com diferentes tipos de deficiência visual. Sendo assim, e dentro desse contexto, o presente trabalho teve como objetivo, avaliar a usabilidade de tecnologias assistivas por serventuários do TJPE que possuem deficiência visual. Para tanto, foi realizada uma pesquisa com questionário usando o Google Forms® para saber a opinião desses servidores sobre a temática abordada. Da população total de 49 pessoas, 26 responderam efetivamente o questionário. O presente trabalho teve anuência do TJPE e foi avaliado e aprovado pelo Comitê de Ética em Pesquisa da Universidade de Pernambuco (UPE), sob nº CAAE nº 52755021.2.0000.5207. Os resultados obtidos mostraram que existem iniciativas quanto à inclusão da pessoa com deficiência visual no TJPE; porém, não se percebeu um processo de continuidade e consistência nas ações em relação ao uso de TA.

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Introduction

Many of us take accessibility for granted. We can live our lives without worrying about reading signs, climbing stairs, or getting around obstructions. However, for individuals with vision-related disabilities, accessibility makes a world of difference. For example, without adequate accessibility, visually impaired people may find it difficult to access a building and move around within it, leaving them dependent on others for help. However, when it comes to accessibility to information technologies, the situation is no different. The mission behind accessibility and digital inclusion is aimed at granting everyone, regardless of disability, the chance to access, understand and interact with content made available in electronic media. These enhancements elevate usability on a global scale, allowing people with blindness, low vision or monocular vision to utilize and enjoy every aspect of the online experience now available. This often involves the use of assistive technologies such as screen readers, electronic magnifiers and special keyboards to navigate websites and apps.

For visually impaired people, assistive technology (AT) is extremely important in removing barriers to mobility, communication, socialization and learning. In this case, AT also helps to minimize the challenges of disability and collaborates intensely in the educational process of each individual.

The Individuals with Disabilities Act, enacted in 1988 by the United States government, defined assistive technology as "any item, piece of equipment, or product system, commercially purchased off the shelf, modified, or customized, that is used to enhance, maintain, or improve the functional capacities of people with disabilities" (Public Law 100-407, 1988).

Assistive Technology for visually impaired people is any tool, equipment, software or product that is used to lower existing barriers in a world designed for visually impaired people. Items like walking sticks, screen-reading software, talking clocks, and more are considered assistive technology. AT for the visually impaired can improve the overall quality of your life in many ways. Whether high-tech or low-tech, TA products increase user access and inclusion (Rabello et al., 2014).

Despite the difficulties encountered, many people with visual impairments have entered the job market in public and private companies. It is exactly in the work context that AT is an instrument of great importance for the inclusion of these people. In Brazil, legislation guarantees reserved places for people with different types of disabilities, in public tenders for different bodies of direct and indirect administration.

It was in this context that, since 2001, the TJPE has had servants with different types of visual impairment in its staff, encouraging and standardizing this practice in the Brazilian Judiciary. In 2020, the National Council of Justice (CNJ) approved a Coordinated Audit Action with the objective of evaluating Digital Accessibility in the bodies of the Judiciary Power in order to guide compliance with regulatory standards on the rights of people with disabilities.

Due to the pandemic, the audit at the TJPE took place between July and September 2021, involving the agency's strategic planning, the assessment of the website's accessibility with the participation of 3 civil servants with different types of disabilities and interviews with civil servants with physical disabilities (Conselho Nacional de Justiça [CNJ], 2021).

It should be noted that, in relation to information systems, the focus of the aforementioned evaluation was only on the TJPE website and concluded that, although the theme of accessibility is present both in the TJPE's 2021-2026 Strategic Planning and in the Strategic Technology Plan of Information and Communication-PETIC 2016-2022, there are still points that need improvement and recommends that "as the requirements for digital accessibility are increasing, the websites and systems of the TJPE must always be adjusted to these new requirements" (Tribunal de Justiça de Pernambuco [TJPE], 2021). The lack of accessibility in the files published on the TJPE website, the absence of assistive technology and the lack of awareness and training on inclusion, were also findings that involve the Information and Communication Technology (ICT) area of the institution. Therefore, within this context, the objective of the present research was to evaluate the usability of assistive technologies by visually impaired servants of the TJPE.

Methodology

Approval of the research by collegiate bodies

Before carrying out the research itself, it was necessary to obtain the consent of the TJPE. This fact was achieved through the Term of Consent of the Personnel Management Secretariat (SGP), which indicated the Functional Monitoring Unit (UAF) of the agency as responsible for contacting the population to be surveyed. This work was submitted to Plataforma Brasil, having been approved by CAAE nº 52755021.2.0000.5207, issued by the Research Ethics Committee of the University of Pernambuco.

Sampling procedure

After approval by the Ethics Committee, a questionnaire prepared in Google Forms® was sent to the population of 49 (forty-nine) visually impaired people, containing 11 (eleven) specific questions about adapting the environment in work activities. of the TJPE, including Assistive Technologies. Information was collected between January and April 2022. The "Term of Free and Informed Consent" was signed by each respondent, with no identification of the participating person. Of the total of 49 people, 26 actually participated in the research.

Statistical analysis of data

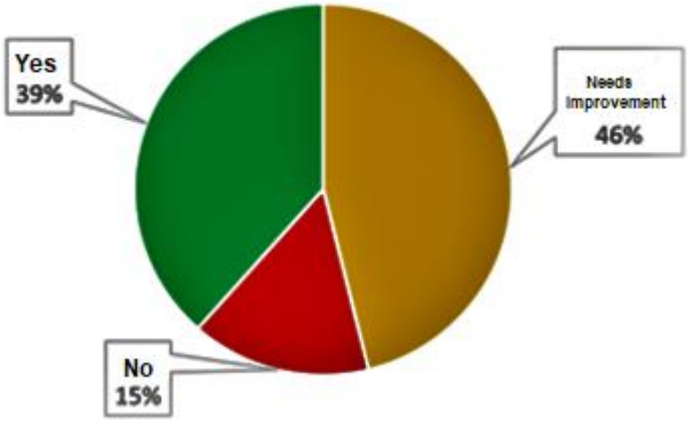
The collected data were analyzed through descriptive statistics using the graphic design of Excel® software. In this case, it was considered that the treatment and experimental design dictate the appropriate method of statistical analysis and the basis for evaluating the accuracy of the means of data treatment. Thus, in the statistical design of data treatment, the factors of interest, the levels of each factor and the relationship between the factors were considered.

Results and Discussion

Adaptation of the environment

Regarding the TJPE work environment, 61% of the servers reported that the environment is not adapted or needs improvement (Figure 1). This information is in line with the accessibility audit recently carried out by the agency (TJPE, 2021), demonstrating that there is accessibility work, however, it is necessary to periodically review the adaptations. The need for adaptation was also demonstrated in studies carried out by Neves-Silva, Prais and Silveira (2015), Barros and Ambiel (2020), and Bomfim et al. (2021), demonstrating that society still needs to evolve in this item, so important for people with visual impairments.

Figure 1.
Perception of adaptation to the environment.



Source: Authors.

Regarding the location of the work unit, the servants who work in the interior of the state mentioned a greater need for improvement and adaptation of the environment. Aligning with the area of activity, the judicial area, the core area of the organization, which is distributed throughout the state, presented a higher percentage of the need for adaptation, unlike the middle area, which is smaller and closer to top management. It can be inferred that the proximity to the headquarters facilitates the identification of needs, and that the end area, due to its capillarity, needs more accessibility actions. The data are shown in Table 1.

Table 1.
Adaptation of the environment versus location, area of activity and type of disability

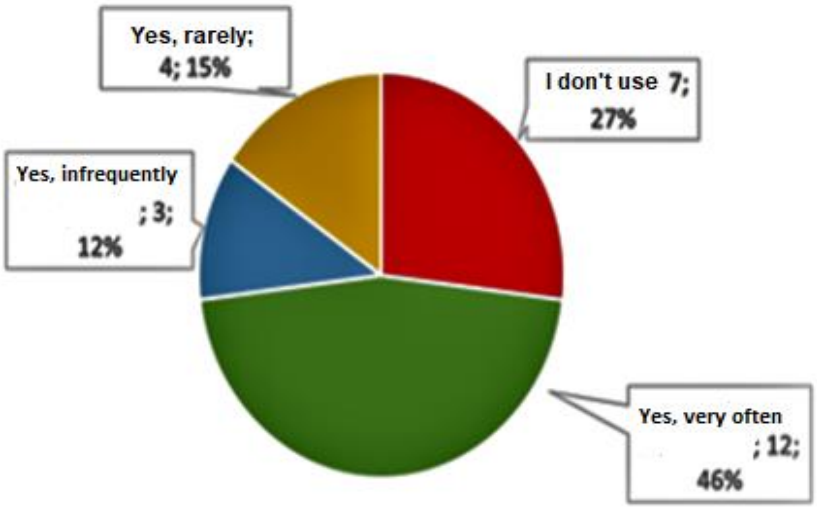
Variable	Value	Needs improvement	Not adapted	Yes
Location	Capital and Metropolitan Region of Recife (RMR)	8 56%	2	8 44%
	Interior	4 75%	2	2 25%
Occupation area	Administrative	3 38,5%		5 62,5%
	Judicial	9 72%	4	5 28%

Source: Authors.

Use of Assistive Technology (AT)

Regarding AT, as shown in Figure 2, 7 respondents (27%) reported not using it in the work environment; 19 (73%) reported using them at different frequencies; and 46% reported using it very often. Faced with the diversity of degrees of disability, as stated by Silva and Santana (2020), the use of AT is shown to be an individual choice.

Figure 2.
Frequency of AT use in the TJPE environment.



Source: Authors.

Of the respondents, 24 people (92%) agree that AT improves productivity. Two people reported not agreeing with the improvement, reinforcing that the perception is entirely individualized. The high degree of agreement demonstrates how much AT helps in the work activities of the civil servants participating in the research. Still on the AT, 14 people (54%) agree that the equipment used in the TJPE is up to date; while, 12 (46%) perceived it as

outdated. This last result is also in line with the information that there are accessibility initiatives in the TJPE, however, there is still room for improvement. This information is presented in Table 2.

Table 2.
AT ratio versus updating and productivity.

Variable	Totally disagree	Disagree	I agree	I totally agree
Improves the Productivity	0	2	9	15
	8%		92%	
TA updated	2	10	9	5
	46%		54%	

Source: Authors.

Observing the distribution of AT, which the servers reported using in the work environment, among the types of disability (Table 3), observing their use in all degrees (low vision, monocular vision and blindness), not perceiving a relationship between the type of disability and the type of equipment. It was found, for example, that, although there is a greater frequency of the magnifying glass and screen magnifier among people with low vision, and the screen reader has been mentioned by all servers with total blindness and close to blindness, it was observed that, these equipment appears in all groups, suggesting that the choice of equipment type is also characterized as particular. The studies carried out by Borges and Mendes (2018) also verified this individuality.

Another point observed was that, among those who reported not using AT in the work environment, the vast majority are in the group with low vision and monocular vision, where only 1 worker with low deep vision reported not using it. This server also reported that the environment is not adapted, demonstrating that this is a person who still needs to have his environment adapted with AT to perform his work duties.

Still in Table 3, as previously noted, it is possible to verify that, for servants with blindness, there is a greater sensitivity when the environment is not adapted or needs improvement, suggesting that the greater the degree of disability, the more critical the adaptation will be.

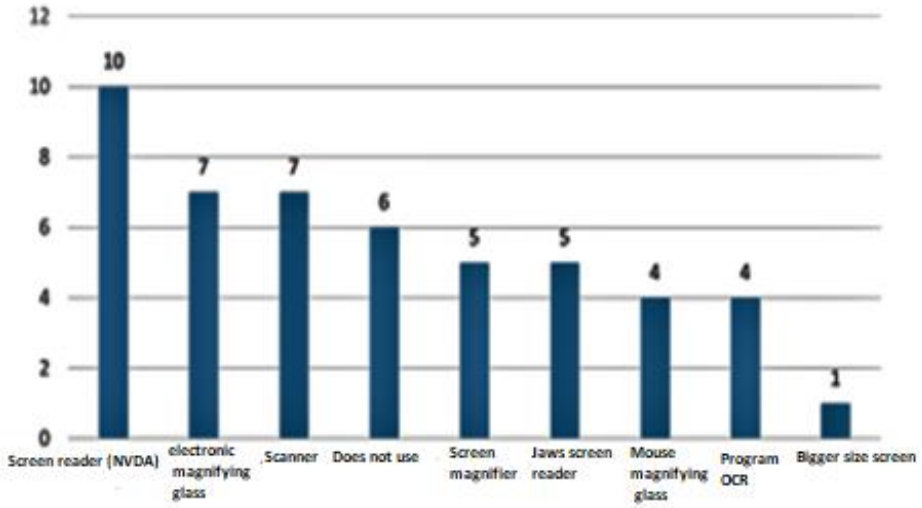
Departing for the frequency of AT equipment used in the TJPE environment, the NVDA screen reader was the most mentioned tool in the research, followed by the electronic magnifying glass and the scanner, as we can see in Figure 3. Of the respondents, 6 servers reported not using AT in their work activities, reinforcing the idea that the option for using the equipment is private; although, in Table 3 its is observed that for greater disability, greater dependence on AT.

Table 3.
TA relationship, type of disability and adaptation to the environment.

Type of disability	**Adapted environment?**		
LOW VISION			
Moderate low vision	**Needs improvement**	**No**	**Yes**
Screen magnifier			1
NVDA Screen Reader, Screen Magnifier, Electronic Magnifier, Scanner			1
Electronic magnifying glass, Mouse magnifying glass			1
Mouse magnifying glass			1
Moderate low vision, monocular vision	**Needs improvement**	**No**	**Yes**
NVDA Screen Reader, Jaws Screen Reader, Electronic Magnifier, Larger Computer Screen	1		
MONOCULAR VISION			
Monocular vision	**Needs improvement**	**No**	**Yes**
Screen magnifier			2
NVDA Screen Reader, Screen Magnifier, Electronic Magnifier	1		
I don't need			1
Not applicable	1		
I don't use			1
I do not use assistive technology equipment			1
None		1	
BLINDNESS			
Low moderate vision, Low deep vision	**Needs improvement**	**No**	**Yes**
Electronic magnifying glass, Mouse magnifying glass		1	
Low deep vision	**Needs improvement**	**No**	**Yes**
NVDA Screen Reader, Screen Magnifier, Electronic Magnifier, Mouse Magnifier, Scanner			1
NVDA Screen Reader, Jaws Screen Reader, Optical Character Recognition (OCR) Program		1	
Electronic magnifying glass	1		
Electronic magnifying glass, Mouse magnifying glass	1		
None		1	
Close to blindness	**Needs improvement**	**No**	**Yes**
NVDA Screen Reader, Jaws Screen Reader, Scanner	2		
Total blindness	**Needs improvement**	**No**	**Yes**
NVDA screen reader	1		
NVDA Screen Reader, Jaws Screen Reader, Scanner, Optical Character Recognition (OCR) Program	2		
NVDA Screen Reader, Scanner, Optical Character Recognition (OCR) Program	2		

Source: Authors.

Figure 3.
Most used assistive technologies.

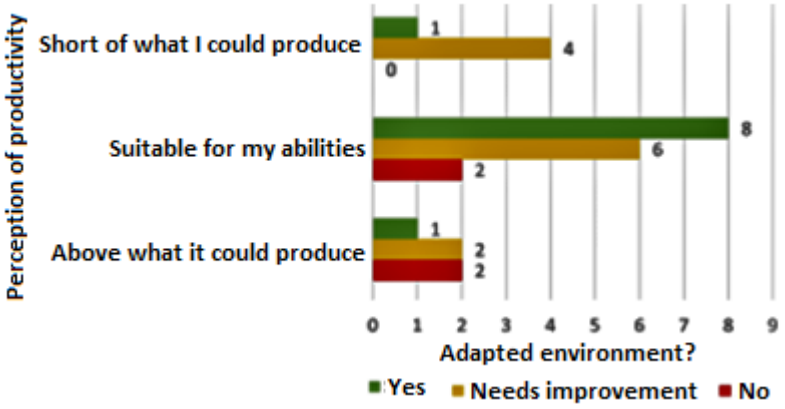


Source: Authors.

Productivity offending elements

The self-perception of the productivity of the TJPE servants with visual impairment, was demonstrated in the survey with 62% (16) of the respondents, who informed that their work activities are adequate to their abilities; 19% (5) reported being above capabilities; while 19% (5) stated that they were below their capacities (Figure 4). The presence of the 38% who reported that their productivity is not adequate to their abilities, is in line with the thought of Carvalho-Freitas (2009), who warned about the need to verify the possible barriers existing in the work environment, with the objective of work on discouragement due to the lack of autonomy and adaptation that prevent effective productivity.

Figure 4.
Perception of productivity versus perception of adaptation to the environment.



Source: Authors.

Conclusion

An inclusion initiative for visually impaired people must seek, together with this public, the best way to do so. Surveying the perceptions of servants with visual impairments who work at TJPE, allowed observing the high level of awareness about accessibility and inclusion among those surveyed, opening the eyes to many points to be worked on.

With the results obtained, it was possible to verify that there are already initiatives regarding the inclusion of the visually impaired person in the TJPE, although the majority of respondents still express the need to adapt the work environment, strengthening the need for a more effective and perennial work in accessibility in the organization.

Also, the research data also showed that the proximity to senior management facilitates the work of inclusion, suggesting the intensification of accessibility inspections in locations far from the capital.

For the researched public, assistive technology was confirmed as a condition for labor productivity, however the needs and perceptions were individual, independent of the types of disability and their relationship with the types of equipment, although the screen reader was the tool highlighted, demonstrating its high importance in the use of ICT by people with visual impairments.

It was also possible to observe that people with a higher degree of disability were more dependent on AT, but it is essential that each person should be seen as a unique being, with specific needs, and the adaptation of their work environment must respect the limits and unique choices.

The process of accessibility and inclusion must be continuous, it is part of caring for people and is in line with the idea of a sustainable world. Each person needs to be served according to their specific need and this work needs to be constantly reviewed, based on each new demand exposed, and it must be part of the organization's culture.

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