Navigating Digital Hurdles for Persons with Disabilities in WANA

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This report is written by **Ameni Saidani**, a research fellow within the 2023 Mariam Al-Shafei Fellowship on Technology and Human Rights. The report was supervised and reviewed by **Afef Abrougui**.

SMEX is a Lebanese NGO that since 2008 has worked to defend digital rights, promote open culture and local content, and encourage critical, self-regulated engagement with digital technologies, media, and networks across West Asia and North Africa (WANA).

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List of Abbreviations

WANA: West Asia and North Africa

CRPD: Convention on the Right of Persons with Disabilities

NGO: Non-Governmental Organization

iOS: IPhone Operating System

UN: United Nations

ICTs: Information and Communication Technologies

W3C: The World Wide Web Consortium

WAI: Online Accessibility Initiative

WCAG: Web Content Accessibility Guidelines

POUR: Perceivable, Operable, Understandable, Robust

ATAG: Authoring Tool Accessibility Guidelines

UAAG: User Agent Accessibility Guidelines

NCDA: National Council for Disability Affairs

JAWS: Job Access with Speech

NVDA: Non-Visual Desktop Access

ITU: International Telecommunication Union

OCR: Optical Character Recognition

CAPTCHA: Completely Automated Public Turing test to tell Computers and Humans Apart

Executive Summary

This research deployed a qualitative methodology to delve into the hurdles faced by persons with disabilities in the West Asia and North Africa (WANA) region when using digital devices and accessing online content and services. With a primary focus on Tunisia and additional insights from Morocco, Egypt, and Syria, the study used a comprehensive approach that included the perspectives and suggestions of persons with disabilities as well as active engagement with advocates for persons with disabilities rights. The qualitative approach involved conducting a focus group and interviews specifically targeting persons with visual and hearing disabilities. By recognizing the unique challenges faced by individuals with sensory disabilities, the study sought to understand their experiences in accessing digital information. Additionally, interviews with founders of disability organizations in the WANA region provided broader insights into systemic issues and ongoing advocacy efforts. The findings underscore the urgent need for enhanced digital accessibility and the provision of enabling devices for persons with disabilities in the WANA region. The study emphasizes the crucial role of involving persons with disabilities and advocates for their rights in shaping policies and strategies for creating a more inclusive and accessible online environment.

Key Findings

- **Digital accessibility challenges.** Individuals with visual and hearing impairments acknowledge a lack of enjoyment of their digital rights, expressing that they feel excluded and neglected by society and the government due to non-compliance with accessibility standards. The absence of accessibility has resulted in digital exclusion, impacting their sense of citizenship and preventing them from fully enjoying digital privileges and opportunities.
- **Economic constraints.** Economic challenges exacerbate the digital exclusion of persons with disabilities in the WANA region; visually impaired people acknowledge that the high-quality devices required for heavy screen reader software are often financially out of reach. Similarly, deaf people note the necessity of video calls due to their communication requirements, leading to higher data expenses. These affordability issues compound existing barriers, impeding persons with disabilities' access to digital resources and hindering their full integration into the digital landscape.

- **Web design obstacles.** Web design poses a significant hurdle, limiting education and job opportunities for people with disabilities. Government digital services, particularly unfriendly to the visually impaired, force them to share sensitive information with others supporting them to access services. Deaf individuals, often illiterate, struggle with complex instructions on government websites lacking informative sign language visuals or videos.
- **Digital literacy and lack of awareness.** Individuals with hearing and visual impairments, particularly women and girls, face higher risks of harassment and violence in the digital realm. This is exacerbated by a lack of awareness regarding laws and guidelines for online protection. The research also demonstrates a deficiency in skills to effectively use devices, further compromising their online safety.

General recommendations

- **Awareness and dissemination.** Governments should allocate resources to campaigns that educate the public about accessibility laws and guidelines, while non-governemtal organizations (NGOs) and advocacy groups should collaborate to organize workshops and training sessions specifically targeting persons with disabilities. Digital platforms and media outlets should also disseminate information widely and effectively.
- **Economic empowerment.** Governments in the WANA region should introduce measures to provide digital amenities to persons with disabilities such as internet access and ensuring the availability of specified devices at lower prices.
- **Inclusive web design.** Governments in the WANA region should take a leadership role in web accessibility design, setting a standard for inclusivity in their services without discrimination. Regulations must be enacted to mandate both government institutions and non-government entities to adhere to digital accessibility standards.

For more detailed recommendations, please review the list of recommendations at the end of this report.

Introduction

In our information age, digital connectivity plays a fundamental role in the lives of people. The West Asia and North Africa (WANA) region is no exception, with its dynamic and diverse tapestry of cultures, economies, and societies. The region is experiencing an extraordinary digital transformation, reshaping the landscape for accessing information and basic services.[1] International Telecommunication Union (ITU) data reveal that internet penetration in the Arab States, a subset of the WANA region, has exhibited a steady increase, with approximately 41% of the population accessing the internet in 2020.[2] This increase in digital connectivity has ushered in unprecedented opportunities for engagement, participation, and progress, effectively bridging geographical and socio-economic divides.[3] However, this digital revolution has concurrently cast a spotlight on the glaring disparities in digital accessibility.[4]

In the midst of this digital awakening, Persons with Disabilities in WANA remain on the periphery, grappling with considerable challenges and obstacles as they navigate a digital world filled with barriers to access.[5] Global and regional statistics highlight the significance of the issue.

The World Health Organization (WHO) estimates that over 15% of the world's population lives with some form of disability.[6] The World Bank estimates that the Arab region is home to over 10 million people with disabilities, representing approximately 5% of the total population.[7] This sizable demographic is, unfortunately, one that faces an array of hurdles when it comes to leveraging digital devices and accessing online content. As digital technologies continue to permeate every facet of modern life, from education to healthcare, from commerce to communication, it is crucial to ensure that these technologies are not only accessible but also inclusive.[8] It is in this context that the issue of digital accessibility and inclusivity for persons with disabilities in the WANA region takes center stage. This challenge is the fulcrum around which this research revolves, as it seeks to delve into the multifaceted problems faced by persons with disabilities when navigating the digital sphere. The pressing issues range from insufficient accessibility features on websites, rendering digital content and services largely

[1] Omer Faleh, “The Digitalization Landscape in Iraq and the MENA Region: Lessons to Learn from,” kapita, 2023, https://kapita.iq/content/issue/digitalization-landscape-iraq-and-mena-region
[2] International Telecommunication Union (ITU), “ICT Data and Statistics.”, 2021, https://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx
[3] OECD Digital Government Studies,” Benchmarking Digital Government Strategies in MENA Countries”, 2017 https://www.oecd.org/mena/governance/digital-governance-mena.pdf
[4] Laurent Bergeron Collin, “A Roadmap to Digital Accessibility”, 2023, https://busrides-trajetsenbus.csps-efpc.gc.ca/en/ep-111-en
[5] Sida, “Disability Rights in the Middle East & North Africa”, 2014, https://cdn.sida.se/app/uploads/2021/05/10142325/rights-of-persons-with-disabilities-mena.pdf
[6] World Health Organization, “Disability”, 2023, https://www.who.int/news-room/fact-sheets/detail/disability-and-health
[7] World Bank, “Disability Inclusion”, 2020, https://www.worldbank.org/en/programs/disability

[8] International Labour Organization, “An inclusive digital economy for people with disabilities”, 2019, https://www.ilo.org/wcmsp5/groups/public/---dgreports/---gender/documents/publication/wcms_769852.pdf

inaccessible, to restricted access to requisite devices for persons with disabilities, further confining their participation in the digital realm.[9] These challenges signify the urgent and immediate need for robust initiatives that enhance digital accessibility and provide the necessary assistive devices to empower persons with disabilities in the WANA region.

This report examines and documents the specific obstacles and challenges faced by people with visual and hearing disabilities in the WANA region in their use of digital devices and internet access. It provides insights into the experiences of persons with disabilities in Tunisia while supplementing these perspectives with data from Morocco, Egypt, and Syria. Moreover, the report seeks to propose strategies and recommendations that can serve as a guiding framework for improving digital accessibility and the provision of necessary devices, thereby empowering persons with disabilities in the WANA region. It is imperative to emphasize that the perspectives and input of persons with disabilities and their advocates are indispensable in shaping policies and strategies that strive to create a more inclusive and accessible online environment.

[9] Sandeep Ravindran, “Common Barriers to Web Accessibility”, Code mantra, 2022, https://codemantra.com/common-barriers-to-web-accessibility/

Methodology

The methodology of this research consists of two phases. The initial phase involves desk research, reviewing articles and previous studies related to the experiences of persons with visual and hearing impairment in the digital sphere. This literature review served as the foundation for understanding existing knowledge and identifying gaps in the research landscape. The second phase encompasses field research, where tailored data gathering tools were employed. Semi-structured interviews with visually impaired individuals, a focus group with the deaf community, and engagement with NGO representatives from the WANA region were deployed. The data collected, spanning both desk and field research, was meticulously analyzed using specialized software, incorporating correlation techniques to glean insights from diverse perspectives and previously published studies.

Interviews

Interviews were carried out with prominent representatives from several disability rights organizations in the WANA region as well as visually impaired individuals in Tunisia.

These semi-structured interviews provided a useful level of flexibility. This qualitative research approach entails asking semi-structured questions to engage with respondents and gather data pertaining to their opinions and experiences on digital accessibility. In both samples, the interviewer serves as a subject matter expert, orchestrating a carefully designed and executed sequence of questions and responses with the aim of comprehending the perspectives of the respondents.

For the visually impaired, interviews were primarily conducted with members of Ibsar Association in Tunisia, an association that advocates for the rights of persons with visual impairments. The total number of interviewees in the sample was 30 people: 16 women and 14 men. The selection of interviewees aimed to achieve gender parity. Regarding age distribution, the majority of the participants were young, with 22 individuals being under the age of 35, while 8 interviewees were 35 years or older. Education levels varied within this sample, with 25 of the participants holding a university degree, and the remaining individuals not holding a university degree. Furthermore, one of the notable characteristics of this sample is the presence of varying degrees of visual impairment. Among the 30 interviewees, 10 individuals had low vision, while 20 had a total loss of vision. This diverse sample allows for a comprehensive exploration of the experiences and challenges faced by visually impaired individuals with different backgrounds and circumstances.

Interviews with organizations working on disability rights provided valuable insights into the work being carried out to support and empower persons with disabilities across the WANA region, shedding light on the various initiatives, innovations, and advocacy efforts aimed at enhancing the lives and well-being of persons with disabilities.

Below is the list of organizations that were interviewed:

Organization Name	Mission	Location	The position of the interviewees
Louis Braille Association	Training and guiding visually impaired people in various fields, including technology, education, and sports.	Tetouan, Morocco	- Founder of the organization - Person responsible for technology and innovation for persons with visual impairment
Rabie Al-Omar Foundation for People with Disabilities	Advocating for the rights of all persons with disabilities for comprehensive and integrated inclusion in public life.	Rabat, Morocco	- Founder of the organization
Egypt Youth Voice Association	It is a youth organization that aims to develop leadership skills and achieve a positive impact in the youth communities of Egypt. It has a special committee of young persons with disabilities allocated to defend the issues of persons with disabilities.	Suez, Egypt	- Head of the committee overseeing the concerns of persons with disabilities
Akkazeh Media Project	Akkazeh is a media project to support persons with disabilities. It works to change the narratives (media and popular) circulating about disability issues, and seeks to produce scientific and awareness-raising content that takes into account the wants and requirements of persons with disabilities.	Syria	- Founder of the project - Founder of Imaa for Service and Education of the Deaf in Akkazah

Focus Group

The focus group method is a qualitative data collection technique involving a semi-structured group interview, facilitated with a predetermined set of questions. This method leverages group dynamics to encourage diverse perspectives and stimulate discussions. It promotes the sharing of knowledge, opinions, and experiences among participants, often unveiling unexpected insights rooted in their social, cultural, or religious values. This approach is valuable for assessing participants' experiences, requirements, expectations, and perceptions. It sheds light on how individuals perceive complex issues.[10]

The focus Group was done in a hotel in Tunis, Tunisia and involved 30 deaf participants, 16 of them women and 14 men. These individuals were affiliated with the Sports and Educational Academy for the Deaf in Tunis, an organization that provides educational and sports services. The majority of participants were young, with 25 of them being under the age of 35, while only 5 participants were 35 years or older. Within this selected group, there was a distinct educational background. Only 5 of the participants held a baccalaureate degree and had continued their higher education. The remaining 25 participants did not have a high school diploma and faced challenges related to reading and writing. This differentiation in educational levels was significant for understanding the varied perspectives and experiences within the focus group. The deliberate inclusion of 5 deaf individuals with a baccalaureate degree aimed to explore how individuals with higher education qualifications interacted with digital accessibility issues and whether they possessed specific knowledge or experiences in this area. This diversity within the focus group allowed for a comprehensive exploration of digital accessibility issues from various educational backgrounds and experiences among deaf individuals.

Data Analysis

Qualitative content analysis was used to analyze the collected data. It consisted of transcribing qualitative data, adopting an analysis grid, coding the information collected, and processing it. This method seeks to account for what the interviewees said in the most objective and reliable way possible.

First, the information collected was recorded and classified anonymously and confidentially by a coding system in numbers and letters. The table below describes the coding that was used.

[10] Besheer Mohamed and Micheal Rotolo, “Methodology: Focus groups”, Pew Research Center, 2023, https://www.pewresearch.org/religion/2023/10/11/methodology-focus-groups/

Type of impairment	- "V" is for the visually impaired.	- "D" is for deaf.
Gender	- "F" for female - "M" for male	- "F" for female - "M" for male
Levels of impairment	- "T" is for total visual impairment - "P" is for partial visual loss	- Code "L" for "light hearing loss," which includes mild hearing loss. - Code "M" for "medium hearing loss," which includes moderate hearing loss and moderately severe hearing loss. - Code "d" for "deep hearing loss," which includes two hearing loss levels: severe hearing loss and profound hearing loss.

Tropes Text Analysis

The research utilized Tropes Text Analysis, a sophisticated semantic analysis software that goes beyond traditional word counting, to explore insights from semi-structured interviews and focus group responses. Tropes operates as a linguistic detective, identifying groups of words with shared meanings, even if they are not exact matches.

What sets Tropes apart is its ability to visualize these word groups as interconnected nodes on a detailed map of ideas. This dynamic representation provides a unique lens to navigate the thematic landscape within the collected data. As Tropes detects patterns and uncovers relationships between these word groups, a clear and vivid picture emerges, offering deeper insights into the perspectives and experiences of the study's participants.

The visual mapping facilitated by Tropes serves as a powerful tool for identifying recurring themes and understanding the complex interplay of ideas within the data. It acts as a guide, making it possible to navigate through the narrative intricacies and revealing shared threads that are woven throughout participants' stories. Leveraging Tropes allows for a heightened awareness of the nuanced issues at hand, extracting richer and more profound understanding of the challenges and requirements of persons with disabilities communities.

Part 1: Desk Research

Chapter 1: Disability Rights: Approaches, Concepts, and Standards

This chapter presents and explains concepts and standards related to disability in three different sections. The first section extensively discusses concepts related to disabilities. This forms the foundation of the study to help readers understand the experiences and challenges faced by persons with disabilities. in the digital space. The section that follows highlights the importance of accessibility standards and guidelines for products and services. It emphasizes how crucial it is to ensure inclusivity for all users in society. By examining these standards, the aim is to understand how equitable access to information and technology can be achieved, ultimately contributing to a digital landscape. The third section of this chapter dives into the policies and regulations governing accessibility in Tunisia, Morocco, Egypt, and Syria. By examining the approaches taken by these countries, readers gain insights into how legal and technological factors interact to shape digital accessibility in WANA. This exploration not only enriches the understanding of stakeholders but also reveals practical challenges and opportunities that they face in their efforts towards digital inclusivity.

1. Disability Approaches

Disability approaches encompass different perspectives and mental frameworks for conceptualizing and comprehending disability. They have the potential to direct policies, practices, and services that assist individuals with disabilities.[11] While there are numerous disability perspectives, a few of the prevalent ones pertinent to this research include:

Social Model of Disability

The social model of disability emphasizes that persons with disabilities are prevented from reaching their full potential not because of their impairment, but as a result of legal, attitudinal, architectural, and other discriminative obstacles. The social model of disability, combined with a rights grounded approach recognizes persons with disabilities as rights holders who can and should determine the course of their lives to the same extent as any member of society.[12] This model can also be influenced by people's attitudes toward differences, such as assuming that persons with disabilities cannot perform certain tasks. It aims to assist in identifying obstacles that create additional challenges for persons with disabilities. Eliminating these obstacles promotes equity and grants individuals living with disabilities enhanced autonomy, opportunity, and authority.[13]

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[11] Olkin, R, “Could you hold the door for me? Including disability in diversity”, Cultural Diversity and Ethnic Minority Psychology, 2002, https://doi.org/10.1037/1099-9809.8.2.130

[12] People with Disability Australia, ”Social model of disability”, https://pwd.org.au/resources/models-of-disability/

[13] Onsomu & al., “Enhancing Inclusivity by Empowering Persons with Disabilities”, Kenya Institute for Public Policy Research and Analysis (KIPPRA), 2022 https://repository.kippra.or.ke/bitstream/handle/123456789/3722/SP32.pdf?sequence=1&isAllowed=y

The Human Rights Model of Disability

The foundation of the human rights model lies in the fundamentals of human rights. It acknowledges that persons with disabilities have the same rights as everyone else in society, and that disability is a natural component of human variety that must be acknowledged and supported in all of its manifestations. People's rights cannot be restricted or denied on the basis of impairment.[14] The United Nations Convention on the Rights of Persons with Disabilities (CRPD) is a significant international legal treaty that gave rise to the human rights disability paradigm.[15] One of nine international human rights instruments created by the United Nations, this document was completed in 2006. It is significant because it was drafted by persons with disabilities with the intention of obtaining greater levels of equality for individuals with disabilities worldwide and discusses the measures that governments must take to support, promote, and preserve the rights of individuals with disabilities.[16]

2. Digital Accessibility Conventions and Guidelines

- **UN Convention: Convention on the Rights of Persons with Disabilities (CRPD)**

A global agreement known as the Convention on the Rights of Persons with Disabilities (CRPD) was approved by the United Nations in 2006. In order to ensure their full and equal involvement in all facets of life, it places a strong emphasis on promoting and defending the rights of persons with disabilities. The CRPD addresses digital accessibility indirectly:

- **Article 3** - General Principles: According to the CRPD's general principles, which include non-discrimination, equality, and accessibility, it is important to create situations where persons with disabilities may exercise their human rights on an equal footing with others.
- **Article 21** - Freedom of Expression and Opinion and Access to Information: This article affirms that persons with disabilities have the same rights to information access and freedom of expression as everyone else. This suggests that in order to guarantee that persons with disabilities fully exercise their rights to access and exchange information online, digital content, including websites, should be accessible.

[14] Degener, T, “A Human Rights Model of Disability”, 2014, https://www.academia.edu/18181994/A_human_rights_model_of_disability
[15] United Nations, Convention on the Rights of Persons with Disabilities., 2006, https://www.un.org/development/desa/disabilities/convention-on-the-rights-of-persons-with-disabilities.html accessed 25 august 2023
[16] Korolkova, J. & Anthony, A., “Prepared for the Disability Human Rights Clinic”, 2016, https://law.unimelb.edu.au/__data/assets/pdf_file/0020/2225162/DHRC-2016-Support.pdf

- **Article 9** - Accessibility: This article places a strong emphasis on the ability of persons with disabilities to live freely and take part in all facets of life, including access to physical settings, modes of transportation, and information and communications, including ICTs. This article emphasizes the importance of accessibility in a variety of situations, including those involving digital goods and services.

According to the CRPD, governments and other stakeholders need to work toward these objectives gradually in order to achieve accessibility and inclusion for persons with disabilities, which involves advancing digital accessibility guidelines and standards.[17]

- **The Marrakesh Treaty**

The Marrakesh Treaty, also known as the Marrakesh Treaty to Facilitate Access to Published Works for Persons Who Are Blind, Visually Impaired, or Otherwise Print-Disabled, is a global accord aimed at simplifying access to published works for individuals with print impairments. It refers to the difficulties experienced by individuals whose impairments, including blindness, vision impairment, or other conditions, prevent them from accessing traditional written documents. The Marrakesh Treaty acknowledges the challenges in accessing books and other printed materials for individuals with print impairments. It allows for the production and distribution of accessible format copies, including digital formats, to those who have trouble reading print, without the need for permission from copyright holders. The treaty recognizes the potential for improved access to printed works through technological advancements. This involves developing and disseminating digitally accessible formats that can be utilized with assistive technology like braille displays, screen readers, and other tools to make material accessible to people who have print difficulties.[18]

- **Web Content Accessibility Guidelines (WCAG)**

The World Wide Web Consortium (W3C) is a global organization that creates standards and rules to guarantee the World Wide Web's long-term expansion. The W3C's dedication to online accessibility through the online Accessibility Initiative (WAI) is a significant component of its activities. WAI creates policies and tools to improve accessibility for those with impairments on the web. The Web Accessibility Initiative developed a collection of standards and recommendations known as the W3C WAI Recommendations. These guidelines offer advice to

[17] United Nations, "Convention on the Rights of Persons with Disabilities.", 2006, https://www.un.org/development/desa/disabilities/convention-on-the-rights-of-persons-with-disabilities.html accessed 25 august 2023

[18] Coates, J. & al., "Getting Started: Implementing the Marrakesh Treaty for Persons with Print Disabilities - A Practical Guide for Librarians.", International Federation of Library Associations and Institutions (IFLA), 2018, https://repository.ifla.org/handle/123456789/443

web designers, developers, and content producers on how to make websites, apps, and digital material usable and accessible for people with different impairments.

A set of standards and success criteria known as WCAG outline how to make web content more accessible. The recommendations are divided into four major concepts, known as the **"POUR"** principles:[19]

- ✔ **Perceivable:** Information and user interface elements must be presented in a way that all users, including those who suffer from visual, auditory, and cognitive disabilities, can understand.
- ✔ **Operable:** Navigation and user interface elements must be usable by users of various skill levels. Voice commands, keyboard navigation, and other input techniques fall under this category.
- ✔ **Understandable:** The presentation of information should be clear and intelligible with consistent navigation and interaction patterns.
- ✔ **Robust:** Web content and technology should be created in a way that allows a wide range of user agents, including assistive technologies, to reliably comprehend it.

The WCAG is divided into three compliance levels: A, AA, and AAA. Adhering to these levels shows how well a website or application meets accessibility requirements. [20]

The Authoring Tool Accessibility Guidelines (ATAG) for web authoring tool developers and the User Agent Accessibility Guidelines (UAAG) for user agents like browsers and assistive technologies are supplementary resources that W3C WAI offers to promote accessibility initiatives.[21]

3. Digital Accessibility for persons with disabilities Policies and Regulations in Tunisia, Morocco, Egypt, and Syria

3.1 Tunisia

- **Tunisian Constitution**: The Tunisian Constitution, adopted in 2022, includes provisions that emphasize the rights of people with disabilities and their inclusion in society.

[19] Mason, A. & al., "Disabilities and the Digital Divide: Assessing Web Accessibility, Readability, and Mobility of Popular Health Websites.", Journal of Health Communication, 2021 https://doi.org/10.1080/10810730.2021.1987591

[20] Eusébio, C., & al, "Website accessibility of travel agents: An evaluation using web diagnostic tool." Journal of Accessibility and Design for All, 2020, https://doi.org/10.17411/jacces.v10i2.277

[21] Shadi Abou-Zahra & Judy Brewer, "Standards, Guidelines, and Trends.", Part of the Human–Computer Interaction Series book series (HCIS), 2019, https://link.springer.com/chapter/10.1007/978-1-4471-7440-0_13

Article 54 of the Constitution explicitly affirms that the state is responsible for ensuring the rights of disabled individuals in various fields, including education, employment, and accessibility.[22]

- **Law No. 41 for 2016 on Revising Law No. 83 for 2005 on the Empowerment and Protection of Persons with Disabilities:** This is a key law aimed at advancing the rights and well-being of persons with disabilities in Tunisia. This law includes a number of important conditions to guarantee accessibility, nondiscrimination, and inclusion for persons with disabilities in all facets of life. The law lays the groundwork for larger inclusion efforts even though it does not specifically include digital accessibility or assistive technologies for people with impairments.[23]

3.2 Morocco

- **The Moroccan Constitution:** The Moroccan Constitution, revised in 2011, includes provisions that emphasize the rights of persons with disabilities and their inclusion in society. Article 22 of the Constitution states that the state is committed to ensuring the protection and integration of persons with disabilities.[24]

3.3 Egypt

- **Egyptian Constitution:** The Egyptian Constitution, revised in 2014, emphasizes the rights of persons with disabilities. Article 81 of the Constitution stipulates that the state shall take the necessary measures to ensure the rights of persons with disabilities in all areas.[25]
- **Law No. 10 of 2018:** This law, also known as the Rights of Persons with Disabilities Law, was enacted in 2018. While it does not focus solely on digital accessibility, it covers various aspects of disability rights, including education, employment, accessibility, and non-discrimination.[26]

[22] Official Gazette of the Republic of Tunisia, "Text of the new Constitution of the Republic of Tunisia", 2022, https://shorturl.at/qPQU1
[23] Law No. 41 of 2016 dated May 16, 2016 amending Directive Law No. 83 of 2005 dated August 1, https://e-inclusion.unescwa.org/ar/resources/1026
[24] The Moroccan Constitution, 2011,https://www.constituteproject.org/constitution/Morocco_2011
[25] The Egyptian Constitution, 2014, https://www.constituteproject.org/constitution/Egypt_2019?lang=ar
[26] Law No. 10 of 2018. Issuing the Law on the Rights of Persons with Disabilities, https://shorturl.at/vwFO8

- **National Council for Disability Affairs (NCDA):** Established in 2018, the NCDA is responsible for coordinating efforts related to disability issues in Egypt. It works on policies and strategies to promote the rights and integration of persons with disabilities, including digital accessibility.[27]

3.4 Syria

- **Law on Persons with Disabilities No. 34 of 2004:** This law requires the government to provide a number of services to persons with disabilities, such as education, employment, healthcare, and social participation. It also prohibits discrimination against persons with disabilities in all areas of life.[28]

[27] Disability In,"Global Directory: Egypt", https://disabilityin.org/country/egypt/
[28] Syria Persons with Disabilities Law No. 34 for 2004, https://e-inclusion.unescwa.org/resources/1072

Chapter 2: Barriers to Digital Inclusion for Persons with Disabilities

For persons with disabilities, consistent use of technology presents serious difficulties, preventing them from reaping its benefits. This chapter explores the barriers that prevent persons with disabilities from being fully involved in digital activities. It builds on existing literature and research to examine the diverse nature of these barriers, including difficult-to-use interfaces, absence of adaptive features, and socio-cultural and economic factors.

1. Technological Factors

1.1 Digital Platforms' Inaccessibility

When creating websites, apps, and other digital services, platform accessibility refers to how well persons with disabilities requirements and adjustments are taken into account. When those requirements are not adequately accounted for, persons with disabilities are prevented from making full use of digital technologies and benefiting from the opportunities they offer.[29] Nowadays, digital platforms play a critical role in many aspects of everyday life, from communication and information access to commerce and entertainment. These platforms, however, can pose substantial obstacles for those with disabilities if they are not created with accessibility in mind.[30]

Individuals with limited vision or blindness find it difficult to use systems that mainly rely on visual components. The absence of appropriate replacement language for photos, a lack of color contrast, and difficult navigation can all be problems.[31] For those with hearing impairments, when platforms do not offer closed captioning for videos or accurate transcription for audio material such as sign language translation and explicative images, deaf or hard-of-hearing people experience accessibility challenges.[32]

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[29] Kent, M, " Disability and eLearning: Opportunities and Barriers.", Disability studies quarterly, 2015 https://dsq-sds.org/index.php/dsq/article/view/3815/3830

[30] Ferri, D., & Favalli, S., "Web Accessibility for People with Disabilities in the European Union: Paving the Road to Social Inclusion.", 2018, https://doi.org/10.3390/soc8020040

[31] Olofsson, S., "Designing Interfaces for the Visually Impaired: Contextual Information and Analysis of User Needs",Umeå University, Department of Applied Physics and Electronics, 2017, https://www.diva-portal.org/smash/get/diva2:1179505/FULLTEXT01.pdf

[32] Miquel Iriarte, M., "The reception of subtitling for the deaf and hard of hearing: Viewers' hearing and communication profile & Subtitling speed of exposure", Universitat Autònoma de Barcelona, Departament de Traducció i d'Interpretació, 2017, https://www.tdx.cat/bitstream/handle/10803/403811/mmi1de1.pdf?sequence=5.xml

1.2 Digital Accessibility Challenges Amplified by the COVID-19 Pandemic

The COVID-19 pandemic has exacerbated social injustice among underprivileged populations that already face exclusion on the social, political, and economic levels.[33] persons with disabilities, who became significantly constrained in their daily activities and lifestyles because of the pandemic, were struggling more than those without disabilities.[34] The COVID-19 pandemic exacerbated existing concerns about accessibility for persons with disabilities . The majority of daily activities moved from in-person settings to virtual ones throughout the pandemic, including e-learning, remote work, remote health checks, and live-streamed services. Due to significant disruptions to the services they depended on, persons with disabilities issues were disproportionately magnified by the rapid move to the virtual world. Limited digital skills and financial constraints are linked to the costs of devices and the difficulty of accessing virtual alternatives.[35]

Students with disabilities have encountered many obstacles since the transition to online education. The difficulties for impaired students have been made worse by inaccessible educational materials, a lack of appropriate assistive technologies, and inadequate instruction in navigating digital platforms.[36] For persons with disabilities, the shift to virtual communication has resulted in social isolation. Effective communication has been hampered by inaccessible video conferencing systems that do not support subtitles or sufficient screen-reader compatibility. Inaccessible websites meant that a sizable segment of the persons with disabilities was kept in the dark as governments and organizations used their websites and digital channels to spread important information about the pandemic. It became difficult for people who are blind or visually impaired to obtain important updates and instructions due to a lack of alt text for photos, poor color contrasts, and inaccessible PDFs.[37]

The socioeconomic aspect is the last one that was significantly impacted by the pandemic for persons with disabilities. During the pandemic, remote work became necessary, but not all work places adapted well to digital platforms. Many persons with disabilities faced difficulties, including the lack of ergonomic home setups, captioning for online meetings, and inaccessible

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[33] Dominelli L. A, “green social work perspective on social work during the time of COVID-19.” Int J Soc Welfare, 2021, https://www.researchgate.net/publication/348443004_A_green_social_work_perspective_on_social_work_during_the_time_of_COVID-19

[34]

[35] Lim Y.E, “Korea Differently Abled Federation; Isolation rather than infection.”, Disability Policy Report, 2022, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8423669/

[36] Alkahtani, M. A., “E-learning for Students With Disabilities During COVID-19: Faculty Attitude and Perception.”, SAGE Open, 2021, https://doi.org/10.1177/21582440211054494

[37] Abuaddous, H. Y. A., & al, “Web Accessibility Challenges.”, International Journal of Advanced Computer Science and Applications, 2016, http://www.ijacsa.thesai.org/

video conferencing equipment. This resulted in feelings of marginalization and loneliness among impaired workers.

2. Socio-Cultural Factors Impacting Digital Accessibility

The socio-cultural environment has a considerable impact on how persons with disabilities, particularly those in WANA, perceive digital accessibility. Inclusion and accessibility in digital settings is greatly influenced by societal attitudes and views of disability. Negative stereotypes and stigmatization can create unwelcoming online settings and limit persons with disabilities' crucial access to the digital space.[38] The socio-cultural context of digital accessibility also places a strong emphasis on policy and legislative issues. Worldwide socio-cultural dynamics of digital accessibility continue to be shaped through collaborative activities between disability advocacy organizations, technology developers, and legislators, producing a more inclusive online environment for persons with disabilities.

3. Economic Constraints on Digital Access

3.1 Affordability of Digital Devices and Services

For persons with disabilities in the WANA region, financial barriers to internet access are a serious concern. Digital products and services are not always affordable, especially for those with limited resources. Digital gadgets, particularly those designed for accessibility, can be less affordable in low-income areas, which poses a barrier to a significant portion of the persons with disabilities population. This affordability challenge may arise from both the inherently higher costs of these devices and the lower income levels of people in those areas.[39]

The price of customized equipment designed to meet the requirements of persons with disabilities is one glaring example. For instance, screen readers and other accessibility-enhancing assistive technology might cost significantly more than equivalent basic equipment. It may sometimes be difficult for persons with disabilities to purchase these

[38] Aljedaani, W., & al., “Emerging challenges of online learning for deaf and hearing-impaired students during COVID-19: a literature review”, Universal Access in the Information Society, 2022, https://www.researchgate.net/publication/362244709_If_online_learning_works_for_you_what_about_deaf_students_Emerging_challenges_of_online_learning_for_deaf_and_hearing-impaired_students_during_COVID-19_a_literature_review

[39] KoK, A., “From fundamentalists to structuralists: bridging the digital divide”, university of oxford, 2010, https://files.eric.ed.gov/fulltext/EJ1098374.pdf

specialized instruments, especially those who are economically poor. The cost of digital devices in this situation may operate as a barrier to digital access, reducing prospects for social participation, employment, and education.[40]

Many persons with disabilities in lower income countries may find it prohibitively expensive to purchase some accessible devices, such as Apple's iOS devices, which are well-known for their ability to run screen readers and other accessibility features.[41] Many people struggle with the decision of whether to spend more money on an expensive, more accessible equipment or choose a more affordable, more common one that might not offer the same level of accessibility.

3.2 Availability of Assistive Technologies

The cost barriers to internet access for persons with disabilities in the area are directly related to the availability of assistive technology. In order for persons with disabilities to efficiently access and use digital products and services, assistive technologies are very important tools. However, the difficulties this demographic faces are made worse by the restricted accessibility and high cost of these technologies.

Due to a number of circumstances, including financial limitations and a lack of understanding, availability of a wide range of assistive technology such as screen readers, braille displays, or adaptable software, can be relatively not available in WANA.[42] Due to their expensive prices and the lack of resources devoted to making them accessible, many persons with disabilities in the region frequently find it difficult to obtain these technologies.

Additionally, although certain nations in the region have worked on increasing the accessibility of assistive technology, these efforts are not always thorough or successfully carried out. This may lead to discrepancies in access between urban and rural locations as well as between various forms of disability.[43] The digital gap is sometimes made worse by the fact that those living in rural or disadvantaged areas frequently have even less access to these technologies.

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[40] Mignamissi, D., & al., “Digital divide and financial development in Africa”, Telecommunications Policy, Elsevier, 2022, https://ideas.repec.org/a/eee/telpol/v45y2021i9s0308596121001038.html

[41] Andrés Larco, “iOS Apps for People with Intellectual Disability: A Quality Assessment”,2018, https://pdfs.semanticscholar.org/b55c/ff239cce32755e2731bfe7c113403fab199c.pdf

[42] Abu Addous, H.,“Web Accessibility Challenges”, International Journal of Advanced Computer Science and Applications, 2016, https://www.researchgate.net/publication/309660088_Web_Accessibility_Challenges

[43] Sida, “Disability Rights in the Middle East & North Africa”, 2014, https://cdn.sida.se/app/uploads/2021/05/10142325/rights-of-persons-with-disabilities-mena.pdf

4. Digital Skills Among Persons with Disabilities

Extensive research has shown the necessity of customized training programs in the area of developing digital skills for people with visual and hearing impairments. It has been demonstrated that acquiring digital skills may considerably improve the independence and quality of life of a person with visual impairments especially when used in conjunction with assistive devices and accessible interfaces.[44] They can access educational materials, browse the internet, and interact with digital information more efficiently with these abilities, which promotes social inclusion and active involvement in the digital society. Additionally, enabling access to online information and services for people with visual impairments has been made possible by the integration of screen readers, braille displays, and voice recognition software into digital literacy training programs.[45] As they rely largely on visual signals and technology like sign language and captioning, people with hearing impairments have special difficulties that must also be taken into account.[46] Accessible communication technologies and multimedia material are important for closing the digital gap for this group of people.[47] Because of this, comprehensive digital skills training programs that take into account both visual and hearing challenges and incorporate user-centered design concepts ensure that people with sensory impairments may participate in digital life and feel empowered.

[44] Rönnberg, J., & al.,"The Ease of Language Understanding (ELU) model: theoretical, empirical, and clinical advances", Frontiers, 2013, https://www.frontiersin.org/articles/10.3389/fnsys.2013.00031/full

[45] Fichten, C., & al., "Accessibility of e-Learning and Computer and Information Technologies for Students with Visual Impairments in Postsecondary Education", Journal of Visual Impairment & Blindness, 2009, https://www.researchgate.net/publication/281318065_Accessibility_of_e-Learning_and_Computer_and_Information_Technologies_for_Students_with_Visual_Impairments_in_Postsecondary_Education

[46] Marschark, M., & Hauser, P. C., "Deaf cognition: Foundations and outcomes.", Oxford University Press, 2012, https://books.google.tn/books?hl=fr&lr=&id=X2yqIBlLgRgC&oi=fnd&pg=PR11&dq=Marschark,+M.,+%26+Hauser,+P.+C.+(Eds.).+(2012).+Deaf+cognition:+Foundations+and+outcomes.+Oxford+University+Press.&ots=tvpybuwgok&sig=iVsjqueRk-XeNVX556Yz6cPrR3s&redir_esc=y#v=onepage&q&f=false

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Part 2: Field Research

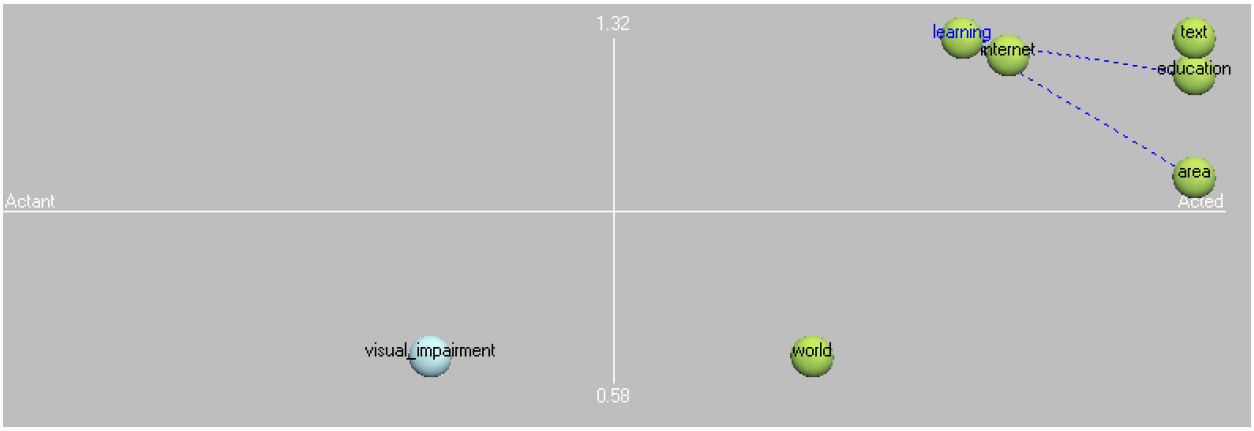
Chapter 1: Education Amidst COVID-19

The challenges faced by 30 persons with visual impairments in Tunisia targeted by the interviews in the realm of education during the COVID-19 pandemic were exacerbated by the rapid transition to online learning and the increased reliance on digital platforms. The following graph illustrates the concentration of relations between main actors revealed a distinct separation of the reference "visual impairment" from the spheres of “learning” and “education.”

The Tropes Text Analysis graph provides a visual representation of the relationships between words or concepts in the data. Each bubble, or "sphere," represents a word or concept, and the distance between bubbles indicates how closely related they are. Closer bubbles suggest stronger correlations, while dotted lines denote weaker connections. The colors of the bubbles indicate different themes. The software generates this mapping based on the responses provided by participants to the researcher's questions, allowing for a nuanced understanding of the data and highlighting patterns or themes that may not be immediately apparent.

In this first graph, each word or concept is like a sphere, and the distance between these spheres tells us how closely related they are. When two spheres are close, it means those words or ideas often go together. If they are far apart, the connection is weaker. The dotted lines linking spheres also convey information; they indicate a weaker correlation, suggesting that while there might be a connection, it's not as strong. In this situation, the following graph shows that "visual impairment" is quite separate from "learning" and "education." This suggests that in the data analyzed, there is a clear distinction between the idea of "visual impairment" and the concepts related to "learning" and "education." This helps us see which words are strongly connected and which ones are more independent in the context of education amidst Covid-19. Additionally, in the Tropes Text Analysis framework, "repere" serves as a reference point or anchor in the text, helping to identify and understand the relationships between different elements. "Actant" refers to entities within the text that perform actions involved in the narrative, while "acted" pertains to the actions or behaviors performed by these actants. These terms are crucial for analyzing the structure, themes, and dynamics of the text under study.

This isolation underscores the significant hurdles faced by this group, specifically the pressing need for Optical Character Recognition (OCR) technology. OCR, essential for converting graphical representations of documents into accessible text, emerged as a pivotal tool for digital accessibility among visually impaired individuals. However, testimonies, such as Yasmine’s experience (coded as 4VFT), shed light on the unavailability and prohibitive cost of OCR technology, hindering the learning experience. This underscored the urgent need for inclusive and affordable technology solutions like OCR to ensure equal access to educational materials for visually impaired students during disruptions like the COVID-19 pandemic.



Graph n°1: Persons with visual impairment and online learning

In a parallel scenario, some individuals with visual impairments, such as the interviewee Mohamed, a young visually impaired male (coded as 7VMT), faced challenges during online university enrollment due to inaccessible platforms. The use of CAPTCHA [48] mechanisms, specifically reCAPTCHA, presented a substantial barrier for independent enrollment, requiring users to interpret visual content. This hurdle led to the reliance on a sighted person's assistance, often resulting in missed deadlines and critical consequences. This issue extended beyond individual experiences, impacting the fundamental right to education for students with visual impairments. The inaccessible enrollment process highlighted the intrinsic connection between digital access rights and the right to education on an equal footing with others. Consequently, it emphasized the need for comprehensive training and accessibility measures to empower individuals with visual impairments in navigating online educational platforms effectively.

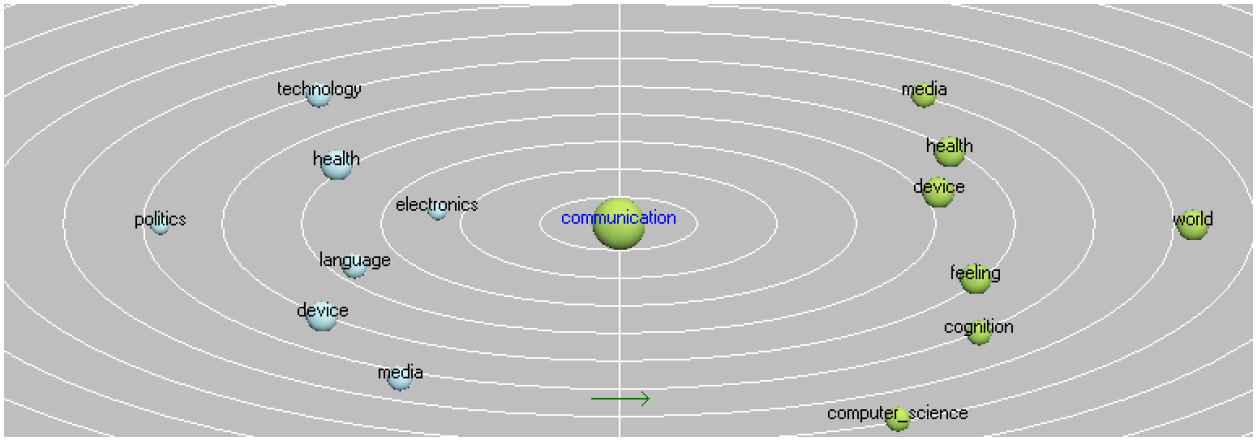
Shifting the focus to individuals with deafness, a significant portion of the deaf, approximately 60% of the focus group, admitted that their education abilities were adversely affected during the COVID-19 pandemic. The primary contributing factor was the lack of training in using online platforms for learning. This substantial gap in preparation hindered the effective utilization of digital tools and platforms, exacerbating the challenges faced by deaf individuals in accessing education remotely. The experiences of this focus group underscore the critical importance of incorporating comprehensive training programs to empower individuals with deafness in navigating online learning environments seamlessly. Addressing these challenges collectively for

[48] CAPTCHA (Completely Automated Public Turing test to tell Computers and Humans Apart) is a security measure used on websites to verify that a user is a human rather than a computer program. It typically involves presenting the user with a challenge, such as typing distorted characters or selecting specific images, that is easy for humans to solve but difficult for automated bots. CAPTCHA helps prevent automated bots from abusing online services, such as creating multiple accounts or submitting spam.

individuals with visual impairments and deafness is crucial for fostering inclusive and equitable education in the digital age.

Chapter 2: Access to Information and Communication

When delving into the realm of digital accessibility for individuals with visual impairments, particularly youth aged between 18 and 34, the key focus in their responses is on the term "communication" highlighting its utmost importance. Accessible communication tools like screen readers and text-to-speech technologies are crucial for them to interact effectively with digital content. In the flowing graph of the Tropes text analysis software, the word "electronics" is right next to "communication" showing how digital devices and technologies are critical for making communication accessible. Another word in the graph, "media" is a bit further, suggesting that digital content like news and information is not as easy for visually impaired individuals to access. Conversely, "politics' is situated furthest from the center and as the smallest sphere in the graph, demonstrating a very weak relationship with digital accessibility. This reflects the significant challenges faced by visually impaired individuals in accessing political information.



Graph n°2: Communication online and persons with visual impairments

75% of the interviewees said they often encounter barriers in accessing critical political information, such as details on election candidates, campaign platforms, and government policies. Digital accessibility is crucial to provide equal access to such information. Inaccessible websites, social media platforms, and government announcements hinder their ability to make informed decisions during elections. The lack of digital accessibility in politics results in reduced engagement, leading to lower voter turnout and decreased participation in political activities.

The challenges extend also into the realm of social media. Users with visual impairments pointed out during interviews the shortcomings of platforms like Facebook, including the lack of detailed descriptions, particularly for emojis and reactions. This makes interactions and

engagement on these platforms less inclusive. Many interviewees such as Massara (coded as 12VFT) prefer Instagram due to its simplicity and user-friendly interface, which reduces the burden on screen reader software.

As for the deaf community in Tunisia, communication is an essential facet of daily life. The focus group data of the 30 deaf participants clearly highlights that communication was the most prevalent concern, closely linked to the issue of "money" as they mentioned. This community faces significant challenges due to the high cost of internet data. Video calls, which serve as their primary means of communication, require a lot of internet data, resulting in substantially higher data consumption compared to the non-disabled population. This discrepancy creates a sense of inequality as deaf individuals feel they are disproportionately burdened by the costs of staying connected, affecting their ability to communicate effectively. During the focus group exchanges, participants suggested that to address these challenges, the government in Tunisia should consider implementing strategies such as subsidies for internet costs and raising public awareness. These actions are essential to ensure equitable access to communication and digital services for the deaf community, ultimately fostering a more inclusive and fair society.

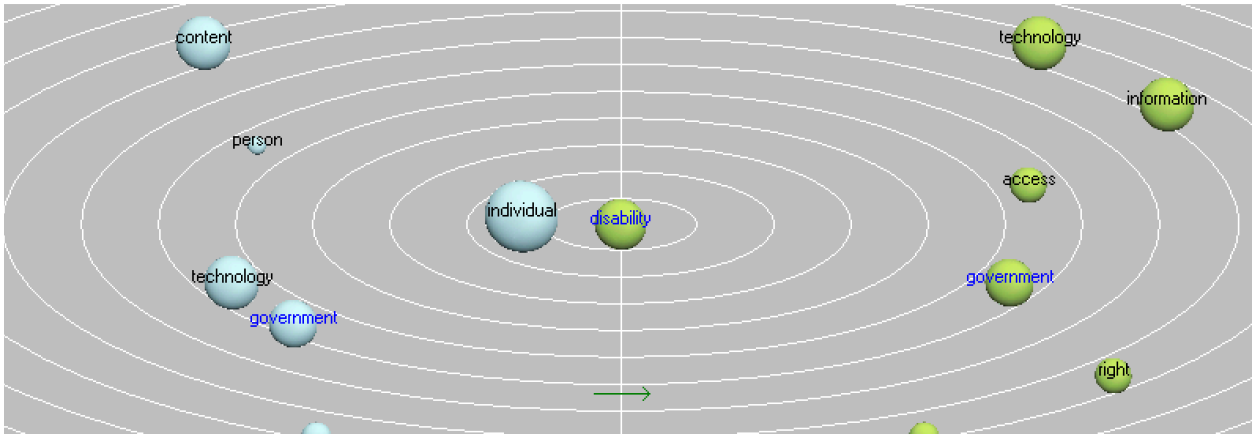
The focus group data reveals that "social network" and "telecommunication" are central references for the deaf community. When participants were asked about the meaning of social networks and how they use them, a clear trend emerged. For many, social networks have essentially become a replacement for traditional telecommunication services. They utilize these platforms predominantly for video calls, which have become a lifeline for deaf individuals, serving as their primary mode of communication.

Deaf individuals view social networks as the contemporary substitute for traditional telecommunication methods. Video calls on platforms like Facebook and Instagram have taken precedence as the primary mode of communication as these visual interactions are crucial for bridging the communication gap imposed by hearing impairment. This shift highlights the adaptability of deaf individuals in embracing technology to address their unique communication requirements. However, while social networks have become integral, participants also expressed limited use of these platforms for accessing information. A significant portion of the deaf community faces illiteracy, which can lead to difficulties in comprehending the more text-based aspects of these platforms. Many resort to memorizing steps to access features like chat, even without a complete understanding of how the platforms function. This limited navigational understanding restricts their internet usage to what they are familiar with, emphasizing the need for improved digital accessibility and literacy support. This highlights the importance of user-centered design in developing social network platforms and telecommunication tools for the deaf community.

The analysis of responses from deaf participants in the focus group, conducted through the software, revealed interesting patterns. The term "information" emerged as the most frequently mentioned word and held a central position, indicating its prominence in the discussions. The close correlation with this central reference suggests that various aspects of "information" were consistently highlighted or discussed in relation to the experiences of the deaf participants, while "safety" stands out as a distinct yet substantial reference. This arrangement unveils critical challenges encountered by the deaf community in the digital realm. The central positioning of "information" in the graph underscores its paramount importance for the deaf community, but the relative correlation also hints at potential limitations in fully enjoying their rights to access information digitally. Moreover, the distinct mention of "safety" highlights notable concerns faced by the deaf community in the digital space, and these challenges are further compounded by various contributing factors. Deaf individuals have mentioned that they often encounter challenges in the digital realm stemming from a lack of digital skills and a limited understanding of device usage. This gap in knowledge leaves them vulnerable to making arbitrary decisions when confronted with pop-up messages or online threats. Furthermore, their susceptibility is compounded by a general lack of awareness regarding essential online safety measures. In Tunisia, where a significant portion of the deaf community is often found to be illiterate, these challenges are further heightened. Limited literacy can act as a barrier to comprehending and discerning online content, exacerbating the risks associated with navigating the digital landscape. Factors such as insufficient accessibility features on digital platforms and a dearth of targeted digital literacy programs further contribute to the vulnerability of deaf individuals in Tunisia, highlighting the need for tailored initiatives to address these multifaceted challenges.

Chapter 3: Web Design and Accessibility

According to data collected in interviews with visually impaired persons in Tunisia, there are five main references related to disability and digital accessibility. The reference "rights," positioned far from the center with a small sphere, indicates that the concept of rights has limited impact on the lives of persons with visual impairments, suggesting that they are not fully enjoying their digital accessibility rights. "Technology" and "government" are close but relatively distant from "disability," signifying that while governments play a role in providing technology, the relationship with disability remains distant. The proximity between "technology" and "government" implies governmental involvement in technology provision, but their offerings may not fully address the digital accessibility requirements of persons with disabilities. Government initiatives need to prioritize technology and devices that enable persons with disabilities to access digital content, ensuring they can be digital citizens. "Content" and "information," positioned at a distance from "disability," have a weak relationship, indicating limited accessibility for persons with disabilities. This weak connection underscores significant challenges in making digital content and information accessible to persons with visual impairments, often due to inaccessible formats or a lack of proper conversion tools.

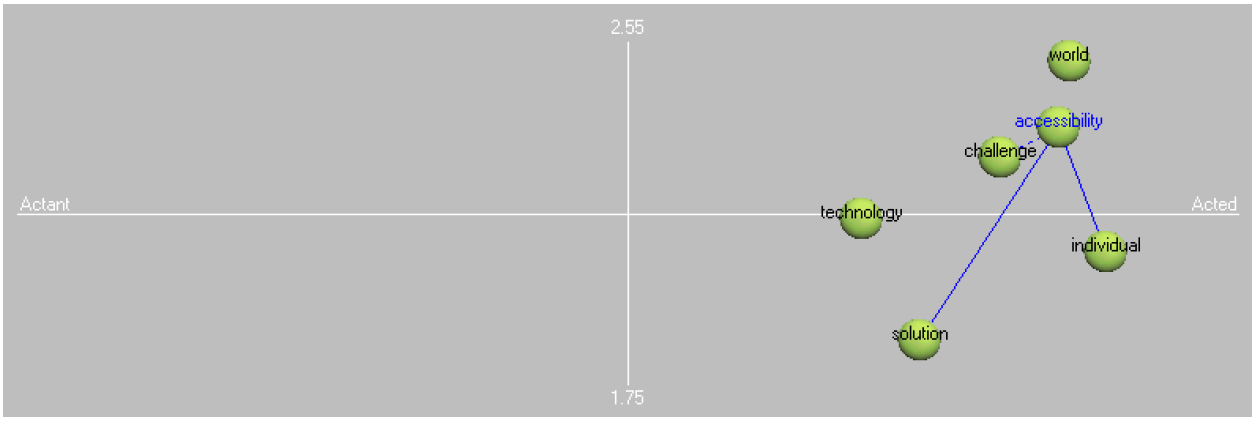


Graph n°3: visually impaired people and the digital world

Challenges related to accessibility are prominently featured in responses from visually impaired individuals, highlighting persistent barriers in accessing digital content, services, and information. Recognizing the importance of digital accessibility, the United Nations, in its Sustainable Development Goals (SDGs), specifically addresses this issue in Goal 10 (Reduced Inequalities) and Goal 4 (Quality Education), emphasizing the need to leave no one behind in the digital age. The mention of COVID-19 as a significant challenge underscores the unique difficulties faced during the pandemic. Basma (11VFP) said that she had to adapt to accessible

platforms for working and information access due to lockdowns and remote learning. This highlighted the urgency of ensuring that digital platforms are universally accessible.

Visually impaired individuals aged 35 and above revealed a compelling narrative about their digital experiences. The prominence of the word "challenges" as the most mentioned term in their answers is strongly correlated with the reference "accessibility," underscoring the central role that digital accessibility plays in addressing the unique challenges faced by this demographic. Interestingly, "technology" is positioned far from accessibility, suggesting that technology has not been effectively harnessed to serve the accessibility requirements of individuals with visual impairments in this age group in Tunisia. Moreover, the continuous line connecting "accessibility" to both "individuals with visual disability" and "solutions" underscores the vital role that accessibility standards play in ensuring the digital rights of this community.



Graph n°4: Accessibility challenges for visually impaired interviewees

One significant and poignant issue raised is the loss of independence. Individuals with visual impairments often find themselves compelled to share personal information with others to access digital services or log in, infringing upon their right to autonomy and personal privacy, perpetuating their discomfort. In addition, deaf individuals have declared that they are frequently excluded from accessing essential information on the internet, including government announcements, due to the lack of content translated into sign language or provided with subtitles. This not only limits their engagement in civic life but also leaves them uninformed and isolated.

Chapter 4: Digital Skills and Awareness

Visually impaired interviewees consistently highlighted their limited digital skills, a concern exacerbated by the lack of experts in the field to provide needed training. In Tunisia, individuals with visual impairments face a dearth of resources and guidance in mastering screen reader devices, hindering their ability to utilize technology effectively and independently. According to the results, the most alarming revelation is that 90% of the visually impaired interviewees lacked knowledge about the laws and legislation designed to protect their rights in the digital space. This lack of awareness extends to the state's obligation to provide facilitation tools. The absence of such knowledge leaves them vulnerable and underscores the need for increased advocacy and education in this regard.

As for the deaf focus group, frequent mention of the term "hacking" in connection with Facebook raises concerns about the security of personal information and accounts on the platform. Hacking incidents pose risks of unauthorized access, data breaches, and potential misuse of personal data, especially within the deaf community. The vulnerability could be due to factors such as limited awareness, communication barriers, or a lack of tailored resources. The identified challenges, including a lack of trainers and experts in digital safety for the deaf community, raise the necessity for tailored solutions. The deaf focus group agreed that creating user-friendly interfaces and providing clear, step-by-step instructions can greatly enhance the accessibility and usability of these platforms, empowering them to navigate the digital world more effectively and safely.

Saber (5DMd), a deaf participant in the focus group, said that online copyright violations had a negative impact on his bakery business due to the theft of his work’s photos from his Facebook page.

Same as visually impaired people, there is a significant awareness gap among the deaf community regarding the laws and legislation designed to protect their digital rights. The results of analysis illustrated this gap by showing the "law and justice" sphere reference at the center and the "deaf" sphere positioned far away from it, symbolizing the disconnect between the deaf community and legal protections in the digital realm. The lack of awareness about laws and protections makes the deaf community more vulnerable to digital hacking, hindering their ability to fully access and engage in the digital world. Addressing this gap requires a multi-faceted approach, including educational initiatives and inclusive policy development. The lack of awareness of the legislation and laws that protect their digital rights is a major issue as deaf individuals may not always know their rights and the potential legal consequences of harmful online behavior. This lack of awareness can lead to unintentional or uninformed digital misconduct, as they may not understand the gravity of their actions.

According to the primary research's findings, women with visual impairments find themselves disproportionately affected by digital challenges, reporting less frequent device usage than their male counterparts. Additionally, they exhibit lower levels of digital literacy, contributing to a wider digital divide. These disparities reflect broader gender inequalities in access to and utilization of digital resources in Tunisia

Within the deaf community, women and girls confront a significant threat of bullying, harassment, and non-consensual use of their images in digital spaces. The unique vulnerability of deaf females in online environments, where video calls serve as their primary mode of communication, underscores the urgent need for comprehensive digital safety measures and legal protections. This disturbing reality necessitates proactive steps to ensure a secure and respectful digital space for them, addressing both the technical and legal aspects of their digital interactions.

Chapter 5: Devices and affordability

Delving into the challenges faced by persons with total visual impairments, the research spotlights critical issues faced by this cohort. The preference for iOS's VoiceOver over Android's TalkBack underscores the importance of user-friendly and efficient technology. However, the struggle with resource-intensive screen reading software on Android devices that demand a considerable amount of device resources, such as processing power and memory reveals a need for more robust hardware. This performance bottleneck extends to popular computer screen reading software like JAWS and NVDA, posing difficulties in navigation and interaction. The demand for formal training in assistive technology is a recurrent theme, emphasizing the scarcity of resources to learn these skills. The absence of experts in the field further compounds the challenge, particularly impacting education and employment.

The experiences of individuals with partial vision loss bring to light a strong emphasis on "accessibility" and "challenges." Despite facing obstacles, their requirements differ from those with total vision loss. Mentioning "accessibility" 37 times underscores its paramount importance, while the term "challenges," mentioned 17 times, highlights the severity of obstacles faced. The emphasis on "telescopic glasses" and "low vision aids" reflects the need for specialized tools catering to their unique requirements. Addressing both physical and emotional aspects of accessibility becomes crucial, particularly for avoiding social stigma and promoting inclusivity.

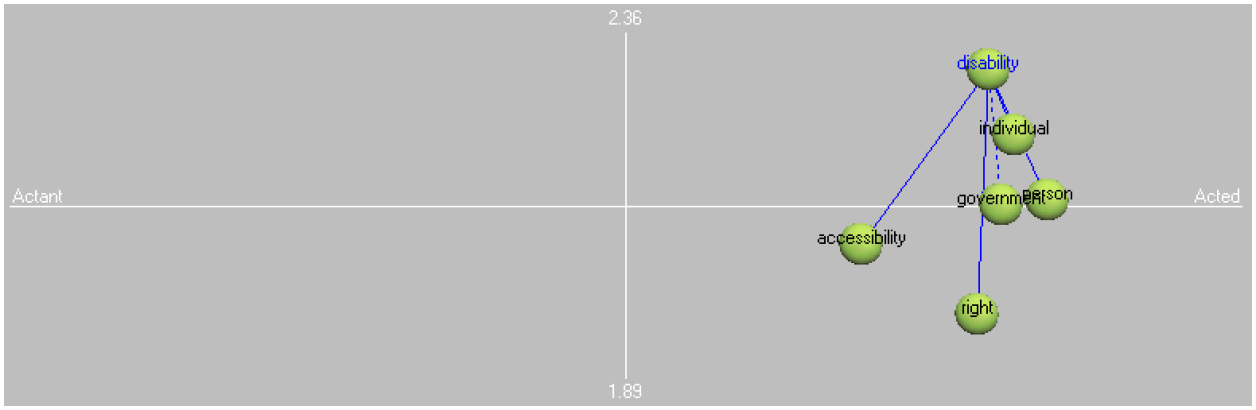
The visually impaired interviewees and the deaf focus group participants exposed significant financial barriers in Tunisia, where internet access is unaffordable. This economic constraint, coupled with low-income backgrounds, limits the ability to purchase data packages, resulting in frequent disconnection and reliance on unsecured public Wi-Fi networks. This not only compromises their digital security but underscores the broader struggle for digital inclusion in economically challenging environments.

Chapter 6: NGO Perspectives: Persons with Disabilities in the Digital Realm in the WANA Region

This section validates the findings from previous fieldwork involving individuals with visual and hearing impairments. The results obtained in this section underscore the challenges faced by people with visual and hearing impairments in Tunisia, which are notably similar to those experienced in other countries within the WANA region. Specifically, in Morocco, interviews were conducted with the founders of two associations, the Louis Braille Association in Tetouan, which is dedicated to advocating for the rights of visually impaired people, and the Rabie El Omer Organization in Rabat, which works with a diverse range of disability categories and types. Furthermore, insights were gathered from Egypt, where the head of a committee specializing in the affairs of persons with disabilities at Voice of Youth shared valuable perspectives. In Syria, the founders of the Akkazeh Platform project in Syria, an initiative focused on supportiuals with disabilities, were also interviewed.

The collective findings of these interviews emphasize the commonality of challenges experienced by persons with disabilities and the importance of recognizing and safeguarding their rights, as well as actively involving them in various aspects of life.

The frequent word categories they used show that 40.8% of their speech included the pronoun "we," while 22.5% contained "they." This prevalence of "we" can be attributed to the fact that three out of four interviewees had a disability, implying that they spoke not only as representatives of their respective communities but also from their personal experiences as individuals with disabilities. Additionally, the term "disabilities" consistently appeared in conjunction with the key concepts of "accessibility," "rights," and "government," among the interviewees. Accessibility was stressed as crucial for ensuring equal access to information and services, "rights" emphasized the fundamental right to access digital spaces without discrimination, and the role of "government" was underscored in enacting policies and regulations to foster digital inclusion and protect the rights of people with disabilities. These connections highlight the need for a comprehensive approach to digital inclusion, ensuring full and equitable engagement with digital technology and information to enhance the participation of individuals with disabilities in society.



Graph n°5: Disability and the digital world in WANA

Furthermore, the interviewees highlight a disparity in the government's strategies and future plans. While there is a growing emphasis on digitalization, the interviewees believe that the requiements and rights of persons with disabilities are often overlooked or forgotten in these initiatives. This omission raises concerns about the potential exclusion of this demographic from the benefits of technological advancements and government services. It underscores the importance of advocating for the inclusion of accessibility features and considerations for individuals with disabilities in government digitalization strategies and planning to ensure equal access and participation for all citizens.

Providing accessible devices for persons with disabilities is a critical aspect highlighted by the interviewees. The interviewees emphasized the government's role in ensuring that persons with disabilities—not just those with visual or hearing impairments—have access to the necessary devices to stay connected. The interviewees point out that many persons with disabilities come from low-income families and face difficulties acquiring expensive devices that enable meaningful digital connectivity.

One interviewee mentioned an Egyptian government initiative that aimed to provide visually impaired individuals with iPad devices to facilitate their digital participation. However, the interviewees note that this initiative had limitations, as it was limited to individuals with total visual loss, excluding those with partial visual impairments. This omission leaves a significant portion of the disabled population without the tools to access digital spaces effectively.

The interviewees' perspective underscores the need for more comprehensive and inclusive government efforts to provide accessible devices to persons with disabilities. Such initiatives should consider the community’s diverse requirements and ensure that everyone has equal opportunities to participate in digital activities. These efforts should take into account the

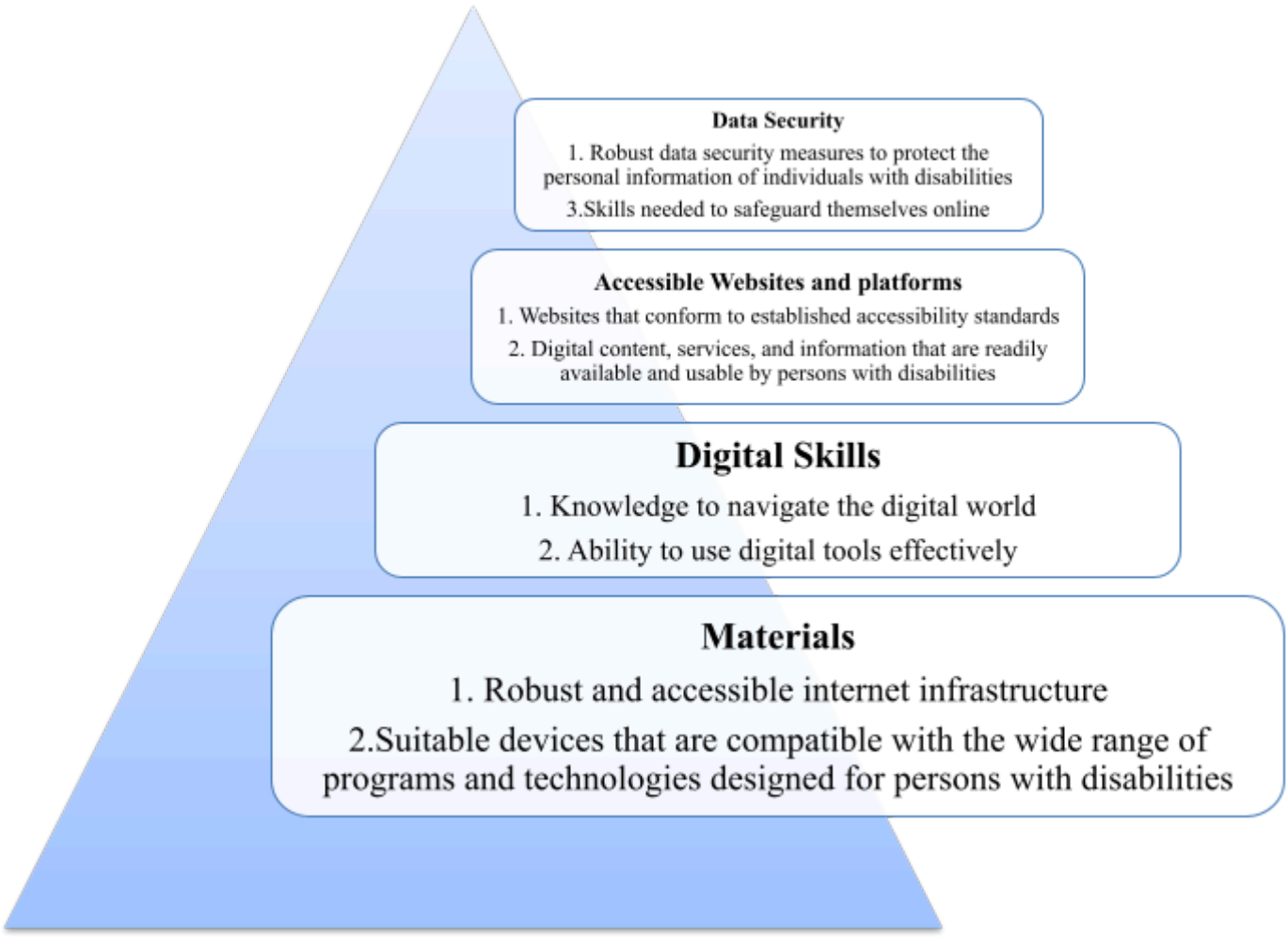
financial constraints faced by many and extend support to a broader range of disabilities, not just those with total impairments.

Knowledge of laws and legislation related to digital rights among persons with disabilities in various WANA regions appears to be limited. Interviewees explained this by highlighting that persons with disabilities often contend with a multitude of primary concerns, such as employment and healthcare, which take precedence in their lives. In this context, digital rights are often viewed as a secondary concern. This perspective is rooted in the fact that individuals with disabilities are primarily preoccupied with fundamental issues, which leaves them with little attention to or awareness of the legal and international conventions associated with digital rights.

Given this observation, it becomes evident that there is a crucial need to initiate awareness campaigns tailored to persons with disabilities on the topic of digital rights and related laws and conventions. By enhancing awareness in this community, persons with disabilities can better understand and assert their digital rights, ensuring equal access, participation, and protection in the digital realm. These campaigns have the potential to empower persons with disabilities to navigate the digital space effectively and advocate for their rights, even as they continue to address their primary concerns.

Conclusion and Recommendations

In conclusion, people with disabilities encounter numerous challenges in the digital realm, including issues of accessibility, the scarcity of devices, lack of awareness and safety concerns. Recognizing these barriers, the research delineated a pyramid of requirements that underscores the imperative for meaningful connectivity for persons with disabilities. Each level of the pyramid plays a crucial role in ensuring a holistic and secure digital experience for this community. By addressing these fundamental requisites, governments, the private sector, and civil society can work towards creating an inclusive digital landscape that caters to the diverse requirements of every individual, fostering a more equitable and accessible technological environment.



Base Level - Materials

At the base of the pyramid is the foundation, which consists of essential materials. This includes a robust and accessible internet infrastructure to ensure reliable connectivity. Furthermore, it encompasses providing suitable devices that are compatible with the wide range of programs and technologies designed for persons with disabilities. This foundation is essential because without a strong infrastructure and suitable devices, all other efforts might be in vain.

Second Level - Digital Skills

The second step is the development of digital skills among persons with disabilities. These skills are pivotal in utilizing digital tools effectively. Empowering individuals with the knowledge to navigate the digital world is the next logical step once the foundational materials are in place. This level allows individuals to actively participate in the digital space.

Third Level - Accessible Websites

The third level focuses on accessible websites conforming to established accessibility standards. These websites ensure that digital content, services, and information are readily available and usable by persons with disabilities. By emphasizing accessibility, it promotes equal opportunities and inclusivity.

Fourth Level - Data Security

Ensuring the safety and security of personal data is of paramount importance. The fourth level involves implementing robust data security measures to protect the personal information of individuals with disabilities. Additionally, it emphasizes the importance of equipping these individuals with the skills needed to safeguard themselves online, promoting a safer digital experience.

The pyramid structure symbolizes a progression from foundational necessities to higher-level capabilities. The rationale behind this order is to establish a strong, supportive infrastructure and build the necessary skills before focusing on specific online accessibility and safety. In essence, this pyramid reflects the gradual development of a comprehensive digital ecosystem that ensures meaningful connections and empowerment for persons with disabilities. Each level serves as a building block, and together, they create a more inclusive and secure digital space for this community.

Recommendations

- Governments should advance digital accessibility for Persons with Disabilities in their annual budgets.

The importance of digital accessibility for persons with disabilities in today's digital world cannot be overstated. It is not only a matter of civil rights and equal opportunities but also a reflection of a just and inclusive society. In this context, governments in the WANA region should ensure improved digital accessibility through the allocation of specific budgets in their annual government budgets for technology innovation in assistive technology and the development of comprehensive programs dedicated to bridging the accessibility gap. This budget should support research and development in the field of assistive technology, fostering innovation, and ensuring that new technologies are not only cutting-edge but also affordable. Such an allocation will stimulate private and public sector collaboration and encourage the creation of user-friendly and adaptable solutions that cater to various types of disabilities.

To maximize the impact of budget allocation, it is essential to develop and implement comprehensive programs that address the diverse requirements of persons with disabilities. These programs should encompass various facets of digital accessibility. For instance, when it comes to education and training**,** initiatives should be designed to train persons with disabilities, developers, and service providers in accessible design principles and technologies. This not only enhances the knowledge base but also fosters a culture of inclusion.

- Governments and policymakers should adopt and implement robust regulatory frameworks for digital accessibility.

Establishing and enforcing accessibility standards is a key component of these programs. Regulatory frameworks should be developed and consistently updated to ensure that digital platforms, services, and products comply with accessibility guidelines. Furthermore, there is a critical need to establish facilities that offer economical data pricing, specifically designed to meet the requirements of persons with disabilities.

- Governments should align relevant legislation to international conventions.

In addition to allocating a budget and developing comprehensive programs, it is imperative for governments in the WANA region to adjust their local legislation to align them to international conventions and treaties that protect the rights of people with disabilities. Specifically,

governments should pay close attention to the United Nations Convention on the Rights of Persons with Disabilities (CRPD) and other relevant international agreements.

By aligning with international conventions, governments not only strengthen their commitment to disability rights but also create a consistent legal framework that fosters digital accessibility. This not only ensures that the rights of persons with disabilities are protected and upheld but also promotes harmony between national and international standards.

- Governments, the private sector, and civil society should engage with each other to enhance digital accessibility.

Successful implementation of these recommendations relies on partnerships and collaboration among government bodies, persons with disabilities organizations, technology companies, and the academic community. Engaging multiple stakeholders ensures a holistic and sustainable approach to enhancing digital accessibility. For instance, civil society organizations in collaboration with the public sector can organize public campaigns to help shift societal attitudes towards disability and promote the value of digital accessibility. These campaigns can both raise awareness and encourage private sector investment in accessible technologies.