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Towards Web Equality: Efforts on Web Accessibility For Persons with Cognitive Disability

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Abstract: ***With the fast-paced development of digital innovations, web technologies are on the rise. With this in mind, making the web accessible for all became an interesting line of research and development. Web accessibility means that websites, tools, and technologies are designed and developed so that people with disabilities can use them with minimal to no supervision. More specifically, people can perceive, understand, navigate, and interact with the web. Over the past years, there have been attempts to achieve web accessibility for web users with physical, visual, and sensory disabilities. However, people with cognitive disabilities were not seen as a user group, thus, leaving them far behind the target general population for improving web accessibility. This paper presents an overview of the current state of web accessibility for people with cognitive disabilities. This paper attempts to come up with a unified definition of web accessibility and identify its components. The study identified the common reasons for the non-conformity of web accessibility. Moreover, the different cognitive disabilities and their linked issues are presented. Furthermore, this study reviews the various interventions made by governments and private organizations worldwide. The study uncovered that web accessibility for people with cognitive disabilities hadn't been a priority for research which resulted in non-conformities with the accessibility guidelines such as poor interface design, confusing guides and instructions, robustness, and lack of features to cater to the needs of people with cognitive disabilities. Results show that in each kind of cognitive disability, namely Deficit Hyperactivity Disorder (ADHD), Autism Spectrum Disorder (ASD), Intellectual Disability, Memory Impairments, Perceptual Disability, and Seizure Disorder, people experience various difficulties in accessing the web, specifically on processing too much content or information, confusing instructions, typographies, and grammar. Laws have been imposed on different Asian and Western countries to address these difficulties. In contrast, other countries and organizations have adopted the Web Accessibility Guidelines of the World Wide Web Consortium (W3C). In conclusion, as organizations gear toward web equality, governments have the initiative to move towards the goal by implementing different laws and policies driving the WCAG 2.0 as a basis of these to orchestrate the design of websites***

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effectively. Furthermore, this study calls for action for extensive research on web accessibility for cognitive disabilities as it is not only valuable to the vulnerable sector of society but also for the rest of the population.

Keywords: Web Accessibility, Cognitive Web Accessibility, Web Equality, Web and Cognitive Disability

1. INTRODUCTION

The rapid growth of innovative information and communication technologies imposes the adoption of these technologies in different parts of modern life, from the academe to the governmental side. In the context of digitalization, accessibility and universal design have become an integrated part of national legislation and rich discussion on international conventions [1]. The primary goal is to make Web technologies accessible for people of different genders, ages, backgrounds, cultures, and disabilities. Access and these elements are so intertwined that one cannot deny rights status to Internet access without diminishing or denying the associated capabilities [2].

Web or internet access is thus fundamental to exercising one's human rights; however, access to the tool of the internet alone is not sufficient to guarantee web equality.

Overly complex interfaces, lack of alternatives (e.g., symbols along with text, captions instead of audio), and the inability to transform content presentation all prevent the effective use of the internet tool. Access alone is not web content equality [3].

During the past several years, there have been attempts to address web accessibility for Web users with physical, visual, and sensory disabilities. Enormous progress has been made in improving the accessibility of the web for these segments of the disability community. However, despite this progress, web accessibility for users with cognitive disabilities lags far behind the general population and behind [4]. The reason behind this striking issue is due to the difficulty of addressing the variety of the needs and deficits specific to the types of disabilities encompassed by the definition of cognitive disabilities. Moreover, there has been a greater social stigma attached to limitations of cognitive functioning, lower adoption rates of use of information technology, and lowered expectations, too.

In the study of Borg [5], it was uncovered that the current evidence-based on measures for cognitive accessibility to electronic communication are rather thin. Therefore, there is a need for further research in this field, particularly as accessibility to information and communication is a key to people with cognitive disabilities being able to enjoy their human rights and fundamental freedoms. Furthermore, a recent study of Alahmadi [6], investigated the accessibility of the top-ranking universities from 2005 to 2015. Sixty university websites were evaluated for their conformance to the WCAG 2.0 Level AA and found a whopping 27,308 accessibility issues. They concluded that websites still contain many accessibility problems, and there was no improvement in their accessibility through the years.

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From normal access the academe up to the governmental side, web accessibility has been an issue that requires richer discussion. This paper attempts to investigate the current state of web accessibility in general and specifically for cognitive-disabled persons as intertwined with their digital and human rights.

This paper sought to answer the following questions:

1. What is web accessibility and the components needed to achieve standard-level accessibility?
2. What are the different kinds of cognitive disabilities and their linked issues in accessing the web?
3. What are the common reasons for websites' non-conformity with web accessibility guidelines?
4. What efforts have been made or proposed by governments, private organizations and/or the academe to solve the issues of web accessibility for cognitive-disabled persons?

The rest of the paper is structured as Section 2 for methods and Section 3 for the results and discussion. The list of the references utilized for the literature review is provided in the latter part of the paper.

2. METHODOLOGY

In order to achieve the aforementioned research goals, in this section, the methodology and procedures applied were discussed.

2.1 Browsing Research Articles

A comprehensive browsing of research articles has been conducted in various online research databases and repositories such as Google Scholar, ResearchGate, IEEE Xplore Digital Library, ScienceDirect, Semantics Scholar, and Springers. These databases have been utilized to discover and access journal articles, conference proceedings, technical standards, and related materials using the keywords web accessibility, cognitive web accessibility, web equality, and web accessibility for disabled persons. These search terms were used for all fields, including title, abstract, keywords, and full text.

In browsing for research articles online, the following procedure, as crafted by Manu Bhatia [7] and adopted by Hortizuela [50] in reviewing various distributed web technologies were applied:

2.1.1 Getting familiar with the data:

Since most qualitative data are just words, the researcher started by reading the data several times to get familiar with it and start looking for basic observations or patterns. The choice of articles was based on the following criteria:

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- published from January 2015 to 2022
- relevant or has the same line of interest as of this review
- peer-reviewed or a proceeding of a research symposium
- availability of the full-text copy

However, some articles published earlier than 2015 were utilized in order to establish the development of research throughout the years and to establish a need for further research.

2.1.2 Revisiting research objectives:
Here, the researcher revisits the aforementioned research objectives and identifies the questions that can be answered through the collected data

2.1.3 Identifying patterns and connections:
In this process, the researcher looked for the most common responses to questions, identifying data or patterns that can answer research questions, and finding areas that can be explored further. Furthermore, the references section of each research article has been looked upon for any relevant researches that could help in a more comprehensive review.

2.2 Defining Web Accessibility and Identifying Its Standard Components
To be able to come up with a unified definition of "web accessibility", both academic researches and government legislation were taken into consideration. Further, in reviewing academic researches and government legislation for definition retrieval, the following criteria were the basis:

- White papers, or web accessibility guidelines and documentations set by organizations or standardization bodies
- government legislation from different states or countries with a publicly available digital copy of the resolution, bill, or law and are effective up to the date of the conduct of this study

With these bases, coming up with a unified definition of web accessibility will have three different perspectives.

2.3 Identifying the Kinds of Cognitive Disabilities and Their Linked Issues
This paper involves sensor or motor impairments, there is a need to review papers both in an academic and medical perspective. Thus, in choosing the papers to be able to identify the kinds of cognitive disabilities the following metrics:

- paper is published from 2019 to 2022 to ensure the latest descriptions of such impairment
- paper is authored, approved, reviewed by a medical practitioner, or the paper utilized a medical paper as a reference and as formerly described.

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In order to identify the linked issues about web accessibilities, papers both from the academe and governmental files (e.g., legal complaints) were reviewed.

2.4 Identifying the Reasons for Non-Conformity

To point out the common reasons for non-conformity on web accessibility guidelines, focal websites of the papers reviewed are categorized into three:

- academic websites (educational)
- government websites (public service or information retrieval)
- social media websites (Facebook, Twitter etc.)

Reasons for non-conformity are categorized for the sake of fairness of treatment as different websites have distinct purpose and functionality and may differ in guidelines being followed.

2.5 Identifying and reviewing the efforts towards web equality

In identifying the attempts and efforts towards web equality, the following are reviewed:

- academic researches published from 2017 to 2022 as this paper attempts to provide an in-depth view of the topic, which roots in a gap from academic researches from 2015-2017.
- patents, set of rules, standards, and guidelines crafted by web technology organizations
- past and active legislations from different governments pertaining to the exercise of human and digital rights specifying web accessibility for cognitive-disabled persons.

With the metrics provided, papers will be reviewed as to what potential solutions have been developed, who developed it, how it works and their significant impacts toward achieving web equality.

3. RESULTS AND DISCUSSION

3.1 Filtered Researches for Review

In the initial process of browsing for articles in various research databases, presented in Table I. is the average number of results appeared in the different online repositories of researches, exclusive of the article citations, using the different search keywords presented in Section 2.1.

Table I. Search Results From Online Research Repositories

Research Database	Total Number of Results	Peer-Reviewed
Google Scholar	482,000 (approx.)	N/A
IEEE Xplore	1,720	420
ScienceDirect	75,014	63,477
ResearchGate	2,000 (approx.)	N/A

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Semantics Scholar	597,000 (approx.)	51,124
SpringerLink	23,354	5,451

Presented in Column 2 is the total number of results signifying the popularity of the research subject from 2015 up to 2022, which contains all results, including non-scientific writings such as magazines, trade publications, and patents. A total of 71 relevant researches and journal articles have been collected as potential references. However, in order to assure the quality of the paper, these articles have been filtered according to their publishing date in which articles were published from the year 2015 to 2022. These papers were reviewed in accordance with the methods presented in Section 2. Articles gathered came from different authors, institutions, organizations, and countries. Table II presents the tally of the references used in this review and their corresponding repository of origin.

Table II. Tally of Utilized Research Articles and Journals

Research Database	Reference
Google Scholar	[7] [8] [9] [10] [12] [13] [14] [16] [18] [27] [32] [33] [34] [35] [36] [37] [39] [47]
IEEE Xplore	[30] [25] [28] [30] [45] [49]
ScienceDirect	[31] [24]
ResearchGate	[1] [2] [3] [4] [11] [15] [17] [19] [20] [22] [23] [29] [42]
Semantics Scholar	[21] [48]
Springer Link	[5] [6] [26] [38] [40] [41][43] [44] [46]

2.2 Unified Definition of Web Accessibility and Its Components

Making the web accessible and usable by people with disabilities and older people has been a topic of considerable importance since early in its development. However, there is no widely agreed definition of web accessibility [8]. There are famous statements such as by Tim-Berners Lee, known as the inventor of the World Wide Web which he states that “it is critical that the Web be usable by anyone, regardless of individual capabilities and disabilities” [9]. In this section, presented are the three perspectives of defining web accessibility.

To help developers and designers to create more accessible websites, the Web Accessibility Initiative (WAI) of the World Wide Web Consortium (W3C) published some technical accessibility guidelines [10]. The first version of Web Content Accessibility Guidelines (WCAG 1.0) was published in 1999 [11]. In the WCAG 1.0, there has been no definite definition of web accessibility. It only referred to different issues pertaining to webpage design. However, it was conferred that accessibility is in consideration of the numerous users that may be operating in contexts different from others [12]. Furthermore, the WCAG 2.0 succeeds its older version and was published in 2018. In the WCAG 2.0, web content accessibility has been referred as to how to make web content more accessible to people with a wide range of disabilities including visual, auditory, physical, speech, cognitive, language, learning, and neurological disabilities [13]. In the official documentation of the WCAG 2.0

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recommendation, it was state that web accessibility depends not only on accessible content but also on accessible web browsers and other user agents.

In a legal perspective, the international community recognizes that if the internet continues to grow and flourish, it is critically important that it would be accessible to all thus, the United Nations and different governments have signed laws in regulating and harmonizing rights of the people in accessing the web. The United Nations adopts the definition of web accessibility in the WCAG 2.0. Moreover, UN stated that accessible website should benefit everyone and not just those with disabilities, and user must be put at the center of the experience [14]. In Table III, presented are the countries adapting the definition of web (content) accessibility set by the World Wide Web Consortium (W3C) [16].

Table III. Governments Adapting WCAG's Definition of Web Accessibility

Country	Year of Adaptation	WCAG Version (Basis)
Argentina	-	WCAG 1.0
Australia	2016	WCAG 2.0
Canada	2016	WCAG 2.0
China	2008	WCAG 2.0 (derivative)
European Union	2010	WCAG 2.0 (derivative)
Hong Kong	1999	WCAG 2.0
India	2009	WCAG 2.0
Ireland	-	WCAG 2.0
Israel	-	WCAG 2.0
Italy	2004	WCAG 2.0
Japan	-	WCAG 2.0
Netherlands	2016	WCAG 2.0
New Zealand	-	WCAG 2.0
Norway	2013	WCAG 2.0 (derivative)
Peru	-	WCAG 1.0
Philippines	2017	WCAG 2.0
Rep. of Korea	-	WCAG 2.0 (derivative)
United Kingdom	2010	WCAG 2.0
United States	1998	WCAG 2.0

Most of the countries presented in Table 3.0 are adapting the comprehensive guidelines and definition of web accessibility. However, some are only incorporating the guidelines of WCAG 2.0 and have created their own version, thus labeled as derivative. In the succeeding section, provided are the identified kinds of cognitive disabilities and the accessibility issues linked to them.

Countries have derivatives or WCAG versions of their own, however, the components needed to achieve a standard-level web content accessibility for cognitive disabilities are set

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officially by WCAG. These components or requirements (called "success criteria") are in these guidelines [18]:

- **Guideline 1.3** Adaptable. Developers should create content that can be presented in different ways (for example simpler layout) without losing information or structure.
- **Guideline 2.2** Enough Time: Web pages must provide users enough time to read and use content.
- **Guideline 2.4** Navigable: Websites must provide ways to help users navigate, find content, and determine where they are.
- **Guideline 3.1** Readable: In designing web pages, text contents must readable and understandable.
- **Guideline 3.2** Predictable: Developers should make Web pages appear and operate in predictable ways.
- **Guideline 3.3** Input Assistance: Website should always help users avoid and correct mistakes.

These are just chunk of the guidelines. Additional guidance on cognitive accessibility is included in the WCAG Understanding documents and Techniques, including Advisory Techniques. As to understand the provision of these guidelines, the following section presents different kinds of cognitive disabilities and issues linked to them which these guidelines attempt to address.

3.3 Cognitive Disabilities and Linked Web Accessibility Issues

Technology provides opportunities for people to interact with content and to process information in ways that are more usable to them [17]. For instance, people can navigate web contents using different strategies, access information in text, audio, or other formats, and change the presentation of the content according to their individual needs or preferences. However, cognitive and learning disabilities impact how people process information. For instance, they can affect people's perception, memory, language, attention, problem solving, and comprehension. Terminology for categories and conditions varies, and includes intellectual disabilities, developmental disabilities; attention deficit hyperactivity disorder (ADHD), autism, dementia, dyslexia, and more [18].

The W3C explores a wide diversity of people and abilities. In a recent project by Zahra et al. [19] of the said consortium, they highlighted some web accessibility barriers and specific examples f cognitive, learning, and neurological disabilities as covered by the WCAG 2.0 guidelines and they are as follows:

- Attention Deficit Hyperactivity Disorder (ADHD). This is a developmental disorder of self-control. It consists of obvious problems with attention spans, impulse control, and activity level [20]. People with such disorder experience a high sensitivity on distractions which may result to uncontrollable behavior.
- Autism Spectrum Disorder (ASD). Autism Spectrum Disorder (ASD) is a syndrome which affects three developmental abilities: social, communication and interest skills.

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People with ASD usually present difficulties regarding social interaction, verbal and nonverbal communication and imagination, as well as a restricted repertoire of interests and activities [21]. the ASD cognitive profile is biased towards processing local sensory information with less account for global, contextual and semantic information [22], or, in other words, those people with autism tend to focus more on potentially irrelevant details which prevent them from perceiving the bigger picture.

The attention patterns among people with autism may have implications about the way they use the web and the way they search for information within web pages in particular [23]. W3C have identified various challenges being encountered by autistic persons in accessing the web. One of these, the person may not pay attention to primary content because distracted by secondary content. Moreover, they may not participate in web-based interactions with other people, and may not also recall instructions when presented subsequently with an action to perform [24]. Similar to this case is of having an intellectual disability and memory impairment:

- Intellectual Disability. This involves impairments of intelligence, learning more slowly, or difficulty in understanding complex concepts. In Europe and some other countries, they sometime call it as learning disability or developmental disability [20]. Among many different causes of intellectual disabilities is down syndrome. To date, there has not been an analysis of the real abilities of Down syndrome patients but there are studies that show that users with such syndrome have sufficient abilities for computer operations. However, one of the most common problems for people with down syndrome in accessing the web is confusing typographies, grammar and format [25].
- Memory Impairment. This involves limited short-term memory, missing long-term memory, or limited ability to recall language. Among many different causes of memory impairment is dementia [20]. Some people with dementia, however, are actively using computers and the internet but there are several challenges which they encounter. People with dementia experience difficulty in website navigation as it based heavily on language and they need to associate the content of a page with a word or phrase used as a menu item or button label [26].
- Perceptual Disability. Prevalent in countries like Australia, Canada, and the US, perceptual disability involves difficulty in processing auditory, tactile, visual, or other sensory information. This can impact reading (called dyslexia), writing (dysgraphia), processing numbers (dyscalculia), or temporal or spatial orientation [20].
- Seizure Disorder. There are different types of seizure, epilepsy and migraines, which may be in reaction to visual flickering or audio signals at certain frequencies or patterns [20] [21].

There are more cognitive disabilities to name such as multiple sclerosis, mental health (e.g. anxiety, paranoia), and neurodiversity, however, these have not traditionally been seen as a user group for web user development although there has been development on research in a particular disability. In connection to this concern, the succeeding section presents the common reasons for non-conformity on web accessibility guidelines.

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2.4 Common Reasons for Non-Conformity with Accessibility Guidelines

All success criteria (see Section 3.1) in WCAG 2.0 are written as testable criteria for objectively determining if a certain content or webpage satisfies the guidelines provided. According to W3C [27], testing the Success Criteria would involve a combination of automated testing and human evaluation. The content should be tested by those who understand how people with different types of disabilities use the web to evaluate its conformance.

Despite the success criterion and guidelines provided by the international standardization body, in the United States alone, although the Department of Justice has reiterated that ADA Title III does apply to websites, they continue to refuse to provide specific compliance requirements. This lack of a single regulation has led to an increase in web and mobile ADA lawsuits. From 2014 to 2017, there has been an increase in total ADA lawsuits. In 2018, there was an extreme 181% increase in web-based ADA lawsuits as seen in Fig 1 [28].

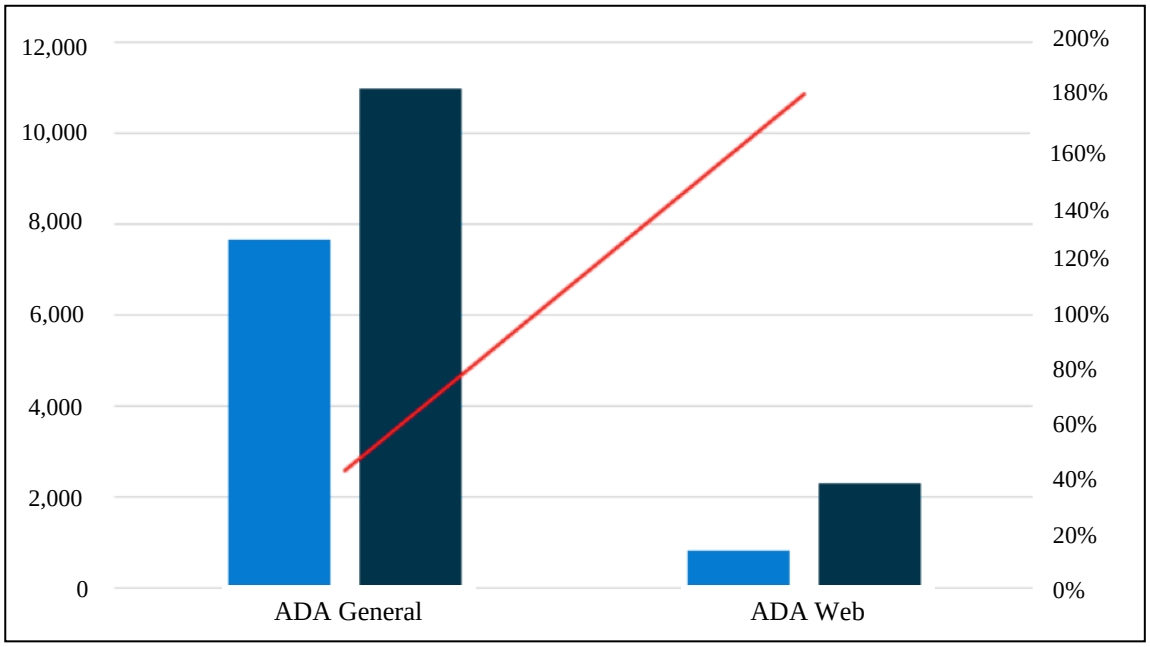

Fig.1 Trend in ADA Web Lawsuits

Moreover, in a recent report of Web AIM (Web Accessibility in Mind) [29], indicates that less than 1% of website home pages are likely to meet standard accessibility requirements. The report found that 97.8% of home pages had automatically detectable Web Content Accessibility Guidelines (WCAG) 2.0 failures.

Furthermore, in the conduct of this review, presented below are the common reasons why websites or web content are not conforming with the accessibility guidelines provided by W3C and by the governments. Papers reviewed have different metrics or method for

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assessing the website accessibility which involves more than 50 higher-education websites and all of them are based on WCAG 2.0 guidelines (see Section 2).

2.4.1 Academic Websites

Various researches have been studying the current state of web accessibility conformance on educational websites. Table IV presents the non-conformity issues on web accessibility guidelines aggregated from different research papers evaluating academic websites which must cater different types of disabilities including those with cognitive impairments.

Table IV. Common Accessibility Issues in Academic Websites

Accessibility Issues	Reference
Inadequate keyboard access	[30] [33] [34]
Display of Icon Alerts	[30] [32] [36]
Illegible Text Sizes	[31] [32] [33] [34] [37]
Missing and/or poor alternative texts on images	[31] [34] [37]
Insufficient color contrast	[30] [32] [35] [37]
Too much animations/transitions	[31] [33] [37]
Technical errors (JavaScript, HTML, CSS etc.)	[30] [33] [34] [35]
Lack of content hierarchy	[30] [31] [34] [36]
Unstructured Navigation	[30] [31] [32] [33]
Robustness	[30] [33] [35] [36] [37]

2.4.2 Government Websites

Web technologies paved the way for government's transition into automation to enhance the delivery of information and services to their citizens. The citizenry includes different facets of life and ability, and e-government services must be accessible for everybody including those who have cognitive disabilities. Table V presents the non-conformity issues of government websites from various countries like the US, China, United Arab Emirates, Australia, Turkey, United Kingdom, Kyrgyz Republic and Libya.

Table V. Common Accessibility Issues in Government Websites

Accessibility Issues	Reference
Language	[38] [40] [42] [43] [44]
Content Heaviness	[38] [40] [41] [42] [43]
Missing Labels or Confusing Instructions	[40] [41] [42] [44]
Poor alternative text	[38] [41] [42]
Lack of Content Hierarchy	[38] [40] [42] [43] [44]
Poor Use of Colors	[38] [40] [41] [42]
Robustness	[38] [39] [40] [42] [43] [44]
Unstructured Navigation and Lack of Hints	[38] [40] [41] [42] [44]
Elements causing display flicker	[40] [41] [42] [44]

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Meaningless link texts	[38] [41] [42] [43] [44]
Technical or programming errors	[38] [40] [42] [44]

2.4.3 Social Networking Sites

Considering the rise of social networking services occurred in recent years and that about 15% of the world's population have some form of disability, it's important to estimate the software quality sub characteristic of web accessibility offered by social networking services [46]. In connection, Table VI presents the common accessibility issues present in most of the social networking sites like Facebook, Twitter, Instagram, YouTube, Gmail and LinkedIn.

Table VI. Accessibility Issues in Social Networking Websites

Accessibility Issues	References
Lack of Closed Captions for Videos	[46] [48] [49]
Incorrect Reading Sequence	[46] [47] [48]
Content Heaviness	[46] [48]
Separation of Presentation and Content	[46] [47]
Multi-Browser Access	[47] [49]

Organizations and researchers have been evaluating the accessibility of websites of different purposes. Although there have been specific points and guidelines identified as commonly committed errors, the reviewed researches uncovered that aside from these violated guidelines, one of the main reasons for non-conformance is the developers' or companies' lack of awareness, compassion, understanding, and commitment in achieving standard-level accessibility [39].

2.5 Efforts Toward Web Equality

Various initiatives have been undertaken in recent years to improve the accessibility of websites in a large number of countries. Web accessibility encompasses this broad range of highly individualized abilities, and combinations of hardware, software, and assistive technologies [30].

As to improve and broaden the scope of guidelines, the W3C extends its WCAG 2 to 2.1 version. Its content conforms to WCAG 2.1 also conforms to WCAG 2.0. The WG intends that for policies requiring conformance to WCAG 2.0, WCAG 2.1 can provide an alternate means of conformance [20]. Moreover, governments are having their initiatives in adapting the guidelines of WCAG 2.0 for both governments, public, and private sectors [18] [20] as presented in Table VII.

Table VII. Web Accessibility Laws and Policies

Country	Name
Australia	DDA Act of 1992
	Procurement Standard Guidance
Canada	Policy on Communications and Federal Identity of 2016

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Denmark	Agreement on the use of open standards for software in the public sector (2017)
European Union	Web and Mobile Accessibility Directive
Hong Kong	Guidelines on Dissemination of Information through Government Websites
India	Guidelines for Indian Government Websites
Ireland	Equal Status Acts 2000 to 2004
Israel	Equal Rights of Persons with Disabilities Act
Italy	Stanca Law
Netherlands	Procurement Law 2012
New Zealand	Online Practice Guidelines of 2013
Philippines	Philippine Web Accessibility Policy of 2017
Switzerland	Federal Law on the Elimination of Inequalities for Persons with Disabilities
UK	Equality Act 2010
USA	Section 508 of the US Rehabilitation Act of 1973, ADA

4. CONCLUSIONS

Since the inception of the World Wide Web it has opened doors of opportunities and advantages for its users. Web technologies have impacted the world in ways we never imagined. From the rise of static webpages to responsive and collaborative websites. In this paper, it has been uncovered that as web develops, so its design for accessibility to cater the needs of the elderly and cognitive-disabled persons.

Web accessibility has been distinctly defined by different organizations but most of the governments like in Argentina, Canada, China, Philippines and the US have adapted the definition of web accessibility by the World Wide Web as to how to make web content more accessible to people with a wide range of disabilities including visual, auditory, physical, speech, cognitive, language, learning, and neurological disabilities. Moreover, not only the definition but also the guidelines provided in the WCAG 2.0 has been adapted or was the basis for these countries' web accessibility guidelines and policies. These guidelines have corresponding success criteria or components such as being adaptable, giving enough time for users to read and use content, making website easily navigable and predicable, and giving room for users to make, avoid, or correct mistakes.

As web accessibility targets a wide group of users, people with cognitive disabilities have been given a focal point despite being disregarded in the past several years because of its complexity. In this paper, we have learned that there are many kinds of cognitive disabilities to name however, the W3C have identified the existing types of cognitive disabilities which the latest version of WCAG caters. These are Attention Deficit Hyperactivity Disorder (ADHD), Autism Spectrum Disorder (ASD), Intellectual Disability, Memory Impairments, Perceptual Disability and Seizure Disorder. Persons with these cognitive disabilities

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experience difficulties in accessing the web specifically on processing too much content or information, confusing instructions, typographies, and grammar.

With the goal of achieving a standard-level accessibility, individuals and organizations have been evaluating numerous websites in terms of their compliance with the WCAG 2.0. Unfortunately, through the help of this study, we have identified non-conformity issues across different websites of distinct purpose like for education, public service and social networking. These issues are not limited to illegible text, issues on robustness, lack of content hierarchy, too much animations, and content heaviness. From another perspective, aside from these accessibility concerns, the lack of awareness, compassion, and understanding of the guidelines are pointed out as one of the major reasons for failure of websites to comply.

However, as organizations gear toward web equality, governments are having the initiative to make a move towards the goal by implement different laws and policies making the WCAG 2.0 as a basis of these. Moreover, as the international standardization body, the World Wide Web Consortium is reviewing its existing guidelines and have evident plans of fully extending its WCAG 2.0 to version 2.1 providing more specific guidelines with a broader range of user groups which may include more accessibility difficulties.

This paper has uncovered that as time passes through and as the web matures, organizations and governments are adapting to this fast-paced change and development in order to achieve better web accessibility and technology protection measure through harmonizing the rights of persons with disabilities.

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