

**The Canadian Journal of Information and Library Science**  
**La Revue canadienne des sciences de l'information et de**  
**bibliothéconomie**



**The Accessibility Levels of the Websites of Federal Higher Education Institutions in Northeast Brazil**

Luana Lobo dos Santos , Ramon Maciel Ferreira  and Thayron Rodrigues Rangel 

Volume 47, Number 2, 2024

Bobcatsss 2024 Special Issue  
Numéro spécial Bobcatsss 2024

URI: <https://id.erudit.org/iderudit/1116011ar>  
DOI: <https://doi.org/10.5206/cjils-rcsib.v47i2.17709>

[See table of contents](#)

**Publisher(s)**

Canadian Association for Information Science - Association canadienne des sciences de l'information

**ISSN**

1195-096X (print)  
1920-7239 (digital)

[Explore this journal](#)

**Cite this article**

Santos, L., Ferreira, R. & Rangel, T. (2024). The Accessibility Levels of the Websites of Federal Higher Education Institutions in Northeast Brazil. *The Canadian Journal of Information and Library Science / La Revue canadienne des sciences de l'information et de bibliothéconomie*, 47(2), 219–228.  
<https://doi.org/10.5206/cjils-rcsib.v47i2.17709>

**Article abstract**

The general aim of this study is to make a diagnosis on the accessibility of information made available on the websites of the Federal Higher Education Institutions (IFES) in the Northeast. It is based on the hypothesis that the websites of the IFES in the Northeast Region of Brazil do not have high levels of adequacy, results that do not allow any user, regardless of being a person with disabilities or other limitations, to access the knowledge made available there, either with the help of assistive technologies or autonomously. The methodological procedures will be bibliographical and documentary research with analysis of primary sources on institutional websites and administrative acts made available, or not, on these sources. All the open data portals will be evaluated and simulated to determine their suitability for eMAG. This will be done using the public software ASES, a system for comparing and validating the standards of construction and behaviour of the source code of electronic sites, pointing out the levels of usability, navigability, alternative text, and content markers regarding the eMAG parameters, which are mandatory for public institutional sites in Brazil in terms of digital accessibility. As a result of the research, it was possible to identify that the levels of accessibility on the websites of these institutions were not in line with the parameters of the Digital Government Accessibility Model (eMag) of Brazil. This reveals divergences in the promotion of access to information; while some IFES make information available autonomously, without facing noise, interference, or impediments to the use of information, others do not so much, which has a negative impact on the guarantee of rights such as the exercise of full citizenship.

© Luana Lobo dos Santos, Ramon Maciel Ferreira and Thayron Rodrigues Rangel, 2024



This document is protected by copyright law. Use of the services of Érudit (including reproduction) is subject to its terms and conditions, which can be viewed online.

<https://apropos.erudit.org/en/users/policy-on-use/>

**Érudit**

This article is disseminated and preserved by Érudit.

Érudit is a non-profit inter-university consortium of the Université de Montréal, Université Laval, and the Université du Québec à Montréal. Its mission is to promote and disseminate research.

<https://www.erudit.org/en/>

# The Accessibility Levels of the Websites of Federal Higher Education Institutions in Northeast Brazil

Luana Lobo dos Santos <sup>1</sup>, Ramon Maciel Ferreira <sup>2</sup>, and Thayron Rodrigues Rangel <sup>3</sup>

<sup>1</sup>National Archive of Brazil

<sup>2</sup>Controladoria Regional da União do Estado do Rio Grande do Norte (CGU)

<sup>3</sup>Instituto Federal de Educação, Ciência e Tecnologia do Rio de Janeiro (IFRJ)

The general aim of this study is to make a diagnosis on the accessibility of information made available on the websites of the Federal Higher Education Institutions (IFES) in the Northeast. It is based on the hypothesis that the websites of the IFES in the Northeast Region of Brazil do not have high levels of adequacy, results that do not allow any user, regardless of being a person with disabilities or other limitations, to access the knowledge made available there, either with the help of assistive technologies or autonomously. The methodological procedures will be bibliographical and documentary research with analysis of primary sources on institutional websites and administrative acts made available, or not, on these sources. All the open data portals will be evaluated and simulated to determine their suitability for eMAG. This will be done using the public software ASES, a system for comparing and validating the standards of construction and behaviour of the source code of electronic sites, pointing out the levels of usability, navigability, alternative text, and content markers regarding the eMAG parameters, which are mandatory for public institutional sites in Brazil in terms of digital accessibility. As a result of the research, it was possible to identify that the levels of accessibility on the websites of these institutions were not in line with the parameters of the Digital Government Accessibility Model (eMag) of Brazil. This reveals divergences in the promotion of access to information; while some IFES make information available autonomously, without facing noise, interference, or impediments to the use of information, others do not so much, which has a negative impact on the guarantee of rights such as the exercise of full citizenship.

*Keywords:* digital accessibility, right of access, digital government, digital government accessibility model of Brazil, Federal Higher Education Institutions, accessibility of information

## Introduction

Any communication process depends on a relationship between the sender and the receiver of the message, and this exchange must be fluid, i.e. it must follow a channel without noise or barriers that could prevent or hinder users from understanding and interpreting the information. Regarding mass communication, certain channels are responsible for advertising and disseminating information, such as television channels, radio, newspapers and websites, which produce the greatest range of information for users.

The Statute of Persons with Disabilities understands communication and information barriers as "any obstacle, attitude, or behavior that makes it difficult or impossible to express or receive messages and information through commu-

nication and information technology systems" (Brazil, 2015).

Through ethical and transparent behaviour, institutions must adopt measures and actions to combat discrimination based on biopsychosocial condition, race, colour, sex, age, language, income, nationality, or place of birth, religion, ethnic origin or socioeconomic vulnerability, disability, pregnancy, and political opinion, among others. In the last two decades, companies and public institutions have been confronted with the consolidation of a public agenda of global interest to realize human rights (social, cultural, political, and economic rights) for vulnerable groups.

Human rights and citizenship have been enshrined in international conventions and treaties in various documents, such as the 2030 Agenda for Sustainable Development, the ISO 26000 standard - Guidelines for Social Responsibility, the Universal Declaration of Human Rights, and the Declaration of the Rights of Persons with Disabilities.

In line with these documents' proposals, the promotion and dissemination of knowledge are believed to be the keys to a society's success. The more knowledge produced, ac-

cumulated, and shared, the greater the chances of having a better-prepared and educated society.

Regarding these aspects, Jardim (2013) states that a healthy rationality between the state and society is established based on the social accountability of government archives, the construction of state transparency, and the empowerment of citizens to exercise effective social control and governance.

In recent decades, several instruments have been published in the literature to guarantee these rights, such as the Archives Law, the Access to Information Law, and, more recently, the General Data Protection Law (Brazil), which serve as mechanisms to represent the obligation of the state (public power) to manage, preserve, and make available to the public the documents and information contained in the archive.

In Brazil, information made available on websites is covered by the constitutional right of access to information, dealt with in item V of Article 5, later regulated by Law 12,527 of November 18, 2011, the Access to Information Law (LAI), and by Decree 7,724 of May 18, 2012, which guarantees each citizen full autonomy of action. Another contribution can be found in the ABNT NBR 16001 Standard - Social Responsibility Management System. To implement socially responsible management, guided by NBR 16001, institutions must implement policies that comply with social responsibility principles and central themes: accountability, transparency, ethical behaviour, governance, human rights, and work practices, among others.

Regarding public sites, in the context of Brazilian archival science, access to documents is a civil right guaranteed by a legal system that began in Brazil with the promulgation of the Federal Constitution in 1988. It represents the right of citizens to build personal and collective memory and social participation through citizenship.

The Information Society (IS) has promoted changes in several areas, including the popularization of the Internet. As a result, websites have become the main means of communication for organizations. In this sense, in response to social demands and a global agenda to make the right of access to information effective for people with disabilities, the educational institutions analyzed (universities and institutes of technical, professional and technological education), under the scope of a legal framework, have the orientation of eliminating the barriers that prevent and hinder access to information in digital environments.

In this way, this research aims to build a diagnosis of the accessibility of information made available on the websites of the Federal Higher Education Institutions (IFES) of the Northeast Region. It is based on the hypothesis that the websites of the Federal Institutes of Higher Education (IFES) in the Northeast of Brazil do not have a high level of adequacy, results that do not allow any user, regardless of being a person with a disability, to access the knowledge made available there, either with the help of assistive technologies

or autonomously.

Since the 1990s, the Ministry of Education has been dedicated to formulating public education policies, especially about access to formal education for people with disabilities (Garcia, Bacarin, Leonardo, 2018). This process, referred to in professional literature as inclusive education, "aims to guarantee the right to education in regular educational institutions for people with special needs, including people with disabilities" (Lima Mendes & Ribeiro, 2017, p. 190).

Evidence found in the literature has suggested inadequate information accessibility on websites. Cusin (2010) found that there are "digital information environments with problems related to the description of resources and their accessibility, which makes it difficult for people with disabilities to use them". Ritter and Roque (2016), when studying the two largest news portals in Brazil, pointed out that the elements that would make it easier for people with disabilities to use the websites were not designed for this purpose. At the state level, Carvalho, Cagnin and Paiva (2017) argue "that most states had several problems concerning web accessibility, with barriers to accessing information".

Secondarily, this research seeks to understand the reality of the content available on institutional websites from the perspective of informational accessibility. As part of the methodological procedures, a sample of IFES was selected to analyze the level of accessibility of their websites. Over 12 months, the research mapped the adequacy or otherwise of the source code to the parameters established as mandatory for the websites of public institutions of the Federal Executive Branch.

The IFES websites listed in Appendix A were analyzed using the Site Accessibility Evaluator and Simulator (ASES) (<https://asesweb.governoeletronico.gov.br/ases/>). Its structure is based on the eGovernment Accessibility Model (eMag), a set of recommendations on how source code should be structured to reach the broadest possible audience.

In its scope, eMag points out a series of actions and elements of adequacy that, if implemented and fully operational, would guarantee the expansion of accessibility to information on public websites. This would prevent the website from becoming a factor of informational exclusion, preventing the full exercise of citizenship.

Considering the above, this article focuses on the study of information published on the websites of Federal Higher Education Institutions (IFES), i.e., Federal Public Information, which is constitutionally classified as Public Heritage and must, therefore, comply with specific rules and legislation on the treatment of public information. Analysis of the data obtained showed that the IFES websites analyzed did not have high levels of accessibility.

In Article 21 of the aforementioned Convention, actions are specified that can provide better enforcement of the right and guarantee of access to information, of which bodies and entities must:

1. Provide to individuals with disabilities, without delay and free of charge, all information intended for the public in accessible formats and technologies appropriate to different types of disabilities;
2. Accept and facilitate the use of sign language, Braille, augmentative and alternative communication, and all other accessible means, modes, and formats of communication of the choice of people with disabilities in official proceedings;
3. Encourage private entities that provide services to the public, including through the Internet, to provide information and services in accessible formats that can be used by individuals with disabilities;
4. Encourage the media, including Internet information providers, to make their services accessible to persons with disabilities;
5. Recognize and promote the use of sign languages [...] (Resende & Vital, 2008, pp.144-145).

In addition, the recognition of its role as an indispensable vital contribution and the concern about social issues related to the right to information has intensified the search for solutions to reduce information inequalities and improve the availability of information, which the United Nations began in the 1990s, in its current plan of action, the 2030 Agenda for Sustainable Development (SANTOS, 2022).

This plan sets out 17 global goals for sustainable development (SDGs), broken down into 169 targets and 232 indicators to be adapted to each country's realities and respective strategic plans. It is guided by people, prosperity, planet, peace, and partnership (United Nations Organization, 2015).

In line with this proposal, issues related to persons with disabilities have been included as targets, i.e. in a functional manner, as shown in Table 1.

It is noteworthy that the proposed solutions to the problems faced by persons with disabilities addressed in the 2030 Agenda follow the interrelated nature of the agenda and the pillar dimensions of sustainable development: social (vocational training), economic (full-employment and decent work and empowerment), and environmental (access to accessible and green transport systems and public spaces).

However, information inequalities and the availability of information, including those faced by persons with disabilities, are not included or linked to target 16.10, which states

that public access to information must be ensured. This demonstrates a lack of awareness of the important role of ensuring accessibility to information, especially for effective empowerment and the promotion of social, economic, and political inclusion.

Accessibility in communication guarantees the elimination of communication barriers to democratize access to information. In contrast, these barriers make it difficult to express and receive information in an accessible manner. Therefore, communicational accessibility, treated by SASSAKI (2009) as an overview of:

Full accessibility in interpersonal relationships: face-to-face, sign language, body language, gesture, etc.), in written communication (newspapers, magazines, books, letters, handouts, etc., including Braille texts, texts with enlarged letters for people with low vision, notebooks, and other assistive technologies to communicate), and in virtual communication (digital accessibility) (SASSAKI, 2009, p.3).

In this context, the communication process (dissemination of data and dissemination of documents) in the IFES in the Northeast region of Brazil, as well as in the entire Brazilian Federal Executive Branch, must be conceived and designed from the point of view of universal access to information, i.e., maximum reach of information, seeking to reduce or eliminate communication barriers. Regardless of the information transmission channel chosen by the institution, it is necessary to adopt strategies such as simplified writing to produce documents.

Another characteristic of the communication process studied in this research is that it qualifies as organizational communication, an intentional communication process with institutional characteristics, values, and mission imputed in the content made available, in this case, through its institutional website.

Rudimar Baldissera (2009) discusses the complexity of organizational communication, based on and formalized for its purposes, which enables and brings the recipient closer to the institution, preventing the message's meaning from suffering interpretive interference while reaching the target audience. In addition, Silva & Baldissera (2021) state that organizations must be integrated into the target audience's culture, that is, understand how the recipient is inserted and contextualized and relate this knowledge to institutional needs.

Understanding the positioning of IFES websites as a digital representation of the institution itself, the content must be aligned with the digital communication standards in federal public institutions. In the case of websites, the main means of organizational communication, information is made available in a digital environment as a public service to inform the population.

**Table 1***Examples of SDGs and targets relating to people with disabilities*

<b>Sustainable Development Goals (SDGs)</b>	<b>Targets</b>
<b>SDG 2 - Zero Hunger</b>	Target 2.2 By 2030, <b>end all forms of malnutrition</b> , including achieving, by 2025, the internationally agreed targets on stunting and wasting in children under 5 years of age, and address the nutritional needs of adolescent girls, pregnant and lactating women and older persons.
<b>SDG 4 - Quality education</b>	Target 4.4) By 2030, substantially increase the number of youth and adults with skills, including technical and vocational skills, relevant for employment, decent work, and entrepreneurship. Target 4.5 By 2030, <b>eliminate gender disparity in education and ensure equal access to all levels of education and vocational training for the most vulnerable</b> , including persons with <b>disabilities</b> , indigenous peoples, and children in vulnerable situations. Target 4.a) Build and improve child-friendly, disability- and gender-sensitive physical facilities for education that provide safe, non-violent, inclusive, and effective learning environments for all.
<b>SDG 5 - Gender equality</b>	Target 5.1 Eliminate all forms of discrimination against all women and girls everywhere. Target 5.b) Increase the use of basic technologies, especially information and communication technologies, to promote women's empowerment.
<b>SDG 8 - Decent work and economic growth</b>	Target 8.5 <b>Achieve, by 2030, full and productive employment and decent work for all women and men</b> , including <b>youth and persons with disabilities</b> , and equal pay for work of equal value. Target 8.10) Strengthen the capacity of national financial institutions to promote the expansion of access to banking, financial and insurance services for all.
<b>SDG 10 - Reduce inequalities</b>	Target 10.2) By 2030, <b>empower and promote the social, economic, and political inclusion of all, irrespective of age, sex, disability, race, ethnicity</b> , origin, religion, economic or other status. Target 10.3) Ensure equal opportunities and reduce inequalities of outcome, including through the elimination of discriminatory laws, policies, and practices, and promote appropriate legislation, policies and actions in this regard.
<b>SDG 11 - Sustainable cities and communities</b>	Target 11.2) By 2030, <b>provide access to safe, accessible, sustainable, and affordable transport systems for all</b> , and improve road safety through the development of public transport, paying particular attention to the needs of people in vulnerable situations, women, children, persons with disabilities and older persons. Target 11.7) By 2030, provide universal access to safe, inclusive, <b>accessible, and green public spaces</b> , especially for women and children, older persons and persons with disabilities.
<b>SDG 13 - Climate action</b>	Target 13.1) Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries. Target 13.3) Enhance education, raise awareness and strengthen human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning. Target 13.b) Promote mechanisms for raising capacity for effective climate change-related planning and management in least developed countries and small island developing States, including focusing on women, youth, and local and marginalized communities.

The universality of access guarantees the impersonality of communication, providing access to information for all citizens, as established in Art. 5 CF/88, regulated by Law No. 12.527 of November 18, 2011, regulated within the Federal Executive Branch by Decree No. 7.724, of May 18, 2012.

Federal Law No. 14.129, of March 29, 2021 - provides for principles, rules, and instruments for Digital Government and for increasing public efficiency and amends Law No. 7.116, of August 29, 1983, Law No. 12.527, of November 18, 2011 (Access to Information Law), Law No. 12.682, of July 9, 2012, and Law No. 13.460, of June 26, 2017.

The guarantee of the right to inform, to be informed and to be informed is set out in the United Nations 2030 Agenda for Sustainable Development as a goal to "ensure public access to information and protect fundamental freedoms, following national legislation and international agreements", to achieve SDG 16, "promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels" (UNITED NATIONS ORGANIZATION, 2015, p. 36).

And in its article 3, Law No. 14.129, of March 29, 2021 (2021) points out principles and guidelines, among them:

VII - The use of language that is clear and understandable to any citizen; VIII - The use of technology to optimize the work processes of public administration; XIX - Accessibility for persons with disabilities or reduced mobility, in accordance with Law No. 13.146, of July 6, 2015 (Statute of Persons with Disabilities). (BRAZIL, 2021).

In other words, a language that is understandable to everyone, which raises the need to monitor and adapt the content of websites to accessible standards, as defined by eMag, whether through improvements or assistive technologies that allow the optimization of information that must be accessible to everyone, a situation that is corroborated and emphasized in Section II of Law No. 14,129, of March 29, 2021 (2021):

Art. 14 - The digital delivery of public services must be carried out using technologies that are widely accessible to the population, including those on low incomes or living in rural and remote areas, without prejudice to the citizen's right to personal service. Sole paragraph. Access to the digital delivery of public services shall preferably be through self-service. Art. 15 The public administration shall participate, in an integrated and cooperative manner, in the consolidation of the National Digital Government Strategy issued by the federal executive, which shall respect the principles and guidelines referred to in art. 3 of this law.

Art. 16: The public administration of each federal entity, within the limits of its competence, may issue a Digital Government Strategy, seeking to make it compatible with the Federal Strategy and those of other entities. (BRAZIL, 2021).

As we can see, the federal government, the sphere in which the IFES are located, is governed and structured by norms that guide how source code and information construction standards should be designed to provide high-level information accessibility features. However, some features may be at odds with what the law requires.

The Site Accessibility Evaluator and Simulator (ASES) is based on the parameters established by the Electronic Government Accessibility Model (2007), eMag. Adopted by the Federal Government through Decree No. 3, of May 7, 2007, within the framework of the Information and Computer Resources Administration System (SISP), it makes its compliance mandatory for Brazilian Government websites.

eMag establishes parameters for adapting source code so that it is accessible. Its text is divided into six sections (Markup, Behavior, Content/Information, Presentation/Design, Multimedia, and Form), in which it presents parameters for the construction and programming of programming languages that, if the code is adequate, allow higher levels of accessibility of digital information.

As discussed in the text, the Statute for People with Disabilities establishes improvements and institutional adaptations to the content made available on the websites of institutions registered in the country, whether private companies or public bodies, deals in its 3rd paragraph with the mandatory accessibility of websites.

The quest to guarantee the accessibility of information within the framework of higher education institutions is also established in Article 6 of Law 13.146/2015 and Article 5 of Decree 7.611/2011, which provides for special education, specialized educational assistance and other measures. The latter states that

Accessibility centers in federal higher education institutions aim to eliminate physical, communication, and information barriers that limit the participation and academic and social development of students with disabilities (BRAZIL, 2011a).

### Methodology

This is an exploratory study of multiple cases within the universe of higher education institutions. For the delimitation of the study, we chose to study the universe of Federal Institutes of Higher Education (IFES) in the Northeast region that appears in the quality report of the Ministry of Education (MEC), the General Course Index (IGC), published in 2018. Educational institutions that do not belong to the public

and federal categories were excluded, and the sample of 28 institutions was focused on the Northeast Region of Brazil.

The quantitative analysis of the data was made possible through evaluations and simulations performed with ASES. With a monthly periodicity, 28 analyses were carried out for 336 analyses. To obtain this diagnosis, the websites of each of the institutions in the sample were subjected to a compliance analysis using the ASES software, which is in the public domain and based on eMag.

The IGC is a set of indicators adopted by the Instituto Nacional de Estudos e Pesquisas Educacionais Anísio Teixeira (INEP), in collaboration with the MEC (Ministry of Education), to assess the quality of educational institutions. The indicators include criteria to evaluate teaching staff, technical staff, and the institution's structure, which is evaluated and scored from 1 to 5. Although it is a comprehensive study, it does not present specific indicators for the accessibility of digital information.

The proposed diagnosis outlined the profile of information accessibility at IFES. Compiling the data has allowed for a deeper understanding of the level of accessibility of the information on the IFES websites that have been created and made available to users.

As a public service for transmitting information, the IFES websites are expected to provide an efficient service, as established by law, from guaranteeing its completeness to the accessibility analyzed here by ASES. At the end of the analysis, the software issues a report in which each line of code has been studied and compared with the accessibility guidelines established to eliminate noise and barriers to communication and information. It was possible to observe the predictability of navigation on federal sites: the more significant the familiarity with the structure, the better the usability. It was also possible to observe shortcomings in the accessibility criteria of some of these sites. The frequency of navigation errors found on the IFES websites led to the hypothesis that these websites may not have a high level of digital information accessibility.

Following current legislation, it is possible to reaffirm that IFES websites follow the same structure established by the Federal Government's Standard Digital Communication Identity, which has been in force since the publication of Ordinance No. 540 on September 8, 2020. This establishes standards and guidelines for constructing digital content, with guidelines, models, and digital structures and functionalities to be implemented in all Executive Branch websites. Therefore, I aim to diagnose the accessibility level of the IFES websites in the Northeast Region and include them in the IGC 2018. Theoretically, they should adopt the same standards for constructing public websites. They are components of the MEC, subject to rules that allow them to compare their respective levels analyzed during the data collection to build an accessibility diagnosis.

A qualitative analysis of the data obtained through the ASES analyses applied to this study provided a broad view of the behaviour of each of the websites over one year. By observing them individually and collectively, it was possible to understand and group the IFES using the average numerical results of the accessibility levels, ultimately indicating an average of the results and thus classifying the sample. The data set analyzed came from the collection of website analysis reports using the Uniform Resource Locator (URL) through the ASES public software from June 2021 to May 2022.

## Results and Discussion

The data was verified by analyzing the URLs of the sites, and it was possible to verify an official report prepared by simulating compliance with the 45 eMag recommendations, categorized into six sections: Labeling (09 recommendations); Behavior (07 recommendations); Content and Information (12 recommendations); Presentation and Design (04 recommendations); Multimedia (5 recommendations); and Forms (8 recommendations). Based on the percentage of compliance verified by ASES, the sites are ranked according to the resulting grade.

However, to discuss the efficiency of the information, it was necessary to recall the characteristic of being a public good and, consequently, by the constitutional structure of the State, it is also a good of universal access to support and document public acts, medium or final activities, rationalizing actions of dissemination, retrieval, and preservation of information.

The storage time of the information in the IFES and other public bodies of the Executive Branch is previously established and structured by a filing plan and records schedule. The storage period of this information in the public environment is also a milestone for its integrity, i.e., if the information must be kept for ten years, it must be integrated for the same period. This logic applies to information that has been stored for one year and even to information that, after evaluation, has been given permanent storage as its final destination.

This is an example of the obligation to preserve public information, maintaining its integrity, allowing high levels of efficiency in the provision of services for a period of time equivalent to the deadlines established by law, which regulate the archival instruments, the filing plan and records schedule relating to the final activities of federal higher education institutions and the filing plan and records schedule relating to the intermediate activities of the federal executive branch.

Damage can prevent the end user from accessing the website content independently or with assistive technology. Communication barriers prevent a continuous flow of interpretation, reducing the website's usability and resulting in a service with a level of accessibility below that expected for state actions. As a parameter for analysis, I use the ranges established in the ASES software report. By comparison, I mean that for a site to be considered efficient, it must reach a "high level of

accessibility, greater than or equal to 95%".

If a site is 95% efficient in terms of accessibility, it will consequently have a 5% reduction in the integrity of the information since a fully compliant site results in integral information, i.e., 100% efficient because it is unchanged, preserved without damage or loss of quality and/or characteristics of the information, maintaining its universal capacity to inform unharmed.

During the data collection process, two errors were found in the source code of the IFES websites studied. The first was an invalid URL, which means that there may have been problems with the configuration of the website's hosting network that prevented a valid Internet Protocol - IP. The IP allows the flow of information on the Internet network and contains metadata that makes it possible to recognize and associate terminals and distinguish between them. This distinction does not occur in this case, and ASES cannot access the URL and analyze the suitability of eMag's accessibility parameters.

The Java Lang NullPointerException error indicates that the ASES software was hindered when analyzing the source code through the URL because it tried to use a code reference with a null value that has not yet been defined in the database. The JavaScript programming language, which is already present and installed, prevents access to the memory object that the system has not yet initialized; this data string is not empty, but it still has no interpretation, i.e., no meaning has yet been established between the parties to the communication process via the URL.

Both situations prevented ASES from issuing a detailed report on the source code analysis, which examined the site's degree of information accessibility. The accounting and analysis of these results for statistical purposes were considered zero since the information does not detail aspects of accessibility but rather a communication barrier.

The sample corresponds to 28 (twenty-eight) IFES, and the respective websites were analyzed monthly from June 2021 to May 2022, a total of 336 collections and analyses of the websites. A statistical summary of the accessibility scores is presented in Table 2.

Considering the simple average between the sum of the indexes of each of the institutions by the value of their quantity:

- A higher average was found in November 2021, with a value of 79.36%.
- In March 2022, the average decreased to 68.13%.
- The overall average for all evaluations was 74.85%. Another finding was the level of accessibility,
- 7.14% of the sites analyzed had a high level of accessibility ( 95%), which means that only two of these institutions.
- In this sense, only 25% of them had a medium level of accessibility (> 95% and 85%), a total of 07 IFES; and

**Table 2**

*Statistical summary of the ASES analysis observations*

	N	Min	Max	Mean	SD
UFRB	12	99.99	100.00	99.99	0.004
UNILAB	12	88.52	99.97	97.44	3.535
IFPI	12	87.5	94.70	93.62	2.201
UFMA	12	90.35	94.45	92.25	1.565
IFAL	12	88.98	90.91	89.40	0.796
IFS	12	88.44	90.33	88.91	0.752
UNIVASF	12	87.9	90.00	88.48	0.806
IFCE	12	87.07	89.17	87.50	0.780
UFRPE	12	0	96.83	85.91	30.194
UFAL	12	84.38	86.66	84.84	0.854
IF Sertão	12	82.72	85.60	83.61	1.126
UFS	12	82.28	84.17	82.67	0.793
IFBA	12	82.22	84.15	82.64	0.796
UFCEG	12	82.08	84.02	82.49	0.805
IFRN	12	81.82	83.73	82.21	0.791
UFCA	12	81.41	83.48	81.84	0.866
IFBAIANO	12	80.29	82.27	80.73	0.792
UFRN	12	80.07	81.95	80.45	0.793
UFOB	12	0	87.50	76.34	26.889
UFBA	12	74.06	76.00	74.45	0.799
UFERSA	12	72.8	75.23	73.62	1.061
UFPE	12	69.5	71.21	69.85	0.719
IFPB	12	0	92.89	64.74	44.677
UFPB	12	0	89.47	53.67	46.194
IFPE	12	0	86.44	51.83	44.611
UFC	12	0	92.69	34.37	44.781
UFPI	12	0	89.56	31.90	41.515
IFMA	12	0	0.00	0.00	0.000
All	336	0.00	100.00	74.85	29.182

- A total of 42.86% of the sites analyzed had a low level of accessibility (> 85% and 70%), a total of 12 HEIs; and
- A total of 25% had a very low level of accessibility (> 70%), a total of 07 institutions; and
- Considering the level of accessibility of information on the ASES websites, 67.86% of the HEIs analyzed presented results with a low or very low level of accessibility; and
- Considering the minimum margin equal to or greater than 95% for information to be considered efficient in terms of accessibility, 92.86% of the institutions evaluated did not reach the level of accessibility on their websites, a total of 26 IFES.

A federal website should be constructed using the eMag



suitability parameters, guaranteeing that the user can use and navigate the content without encountering noise, interference, or impediments to using information. The higher, the better the navigability because there is a minimum number of communication barriers; in other words, HEIs that have a high level of accessibility (>95%) are those where autonomous navigation is easier, while at any lower level of accessibility, the greater the noise and difficulties in using the information.

### Conclusion

The results obtained are based on the simple average of the level of accessibility of the websites during the twelve months of collection, based on the eMag standards and using ASES and its possible evaluation and simulation criteria. This reflects a scenario of information on university websites in the Northeast of Brazil, in which 64.28% of them do not achieve minimum levels of accessibility that guarantee that users can use the content provided autonomously, making it impossible for them to exercise their full citizenship when it comes to accessing the information provided by the universities analyzed.

Any damage may prevent the end user from accessing the website's content independently or through assistive technologies. Communication barriers prevent a continuous flow of interpretation, reducing the website's usability and resulting in a service with a level of accessibility below that expected for state actions.

The ranges established in the ASES software report were used as a parameter for the analysis. For a website to be considered efficient, it must reach "high accessibility, greater than or equal to 95%", i.e., a universal and inclusive digital environment. At low and very low levels, the most serious cases of inadequacy are when the end user may face numerous difficulties in accessing the information or that access will be impossible because the content has not been designed to be universal and accessible.

The structuring of a website that does not have good accessibility features, as identified by eMag, has repercussions on the ease of navigation and, consequently, violates the principles and guidelines of Article 3 of the Digital Government Act regarding the use of clear and accessible language, as well as the guarantees expressed in the Statute of Persons with Disabilities regarding the use of information autonomously or through assistive technologies, when and if necessary. Guarantee the constitutional right of access to information, guaranteed by Article 5 of the Federal Constitution (1988), regulated by the LAI (2011b) and Decree 7.724 (2012), which strengthen and confirm the right of access to information.

### References

Baldissera, R. (2009). Comunicação Organizacional na perspectiva da complexidade. *Organicom*, 6(10-11),

- 115-120. <https://www.revistas.usp.br/organicom/article/view/139013>
- Brasil. (1988). Constituição da República Federativa do Brasil de 1988. *Diário Oficial da República Federativa do Brasil, Brasília / DF*. Seção 1. [http://www.planalto.gov.br/ccivil\\_03/constituicao/constituicao.html](http://www.planalto.gov.br/ccivil_03/constituicao/constituicao.html)
- Brasil. (2007). Portaria nº 3, de 7 de maio de 2007. Institucionaliza o Modelo de Acessibilidade em Governo Eletrônico-e-MAG no âmbito do Sistema de Administração dos Recursos de Informação e Informática-SISP. *Diário Oficial da República Federativa do Brasil*. [https://www.gov.br/governodigital/pt-br/legislacao/portaria3\\_eMAG.pdf](https://www.gov.br/governodigital/pt-br/legislacao/portaria3_eMAG.pdf)
- Brasil. (2011a). Decreto 7.611, de 17 de novembro de 2011. *Dispõe sobre a educação especial, o atendimento educacional especializado e dá outras providências*. [https://www.planalto.gov.br/ccivil\\_03/\\_ato2011-2014/2011/decreto/d7611.html](https://www.planalto.gov.br/ccivil_03/_ato2011-2014/2011/decreto/d7611.html)
- Brasil. (2011b). Lei nº. 12.527, de 18 de novembro de 2011. Regula o acesso a informações previsto no inciso XXXIII do art. 5º no inciso II do § 3º do art. 37 e no § 2º do art. 216 da Constituição Federal; altera a Lei nº. 8.112, de 11 de dezembro de 1990. *Diário Oficial da República Federativa do Brasil, Brasília/DF*. [http://www.planalto.gov.br/ccivil\\_03/\\_ato2011-2014/2011/lei/l12527.html](http://www.planalto.gov.br/ccivil_03/_ato2011-2014/2011/lei/l12527.html)
- Brasil. (2012). Decreto nº. 7.724, de 16 de maio de 2012. Regulamenta a Lei nº. 12.527, de 18 de novembro de 2011, que dispõe sobre o acesso a informações previsto no inciso XXXIII do caput do art. 5º, no inciso II do § 3º do art. 37 e no § 2º do art. 216 da Constituição. *Diário Oficial da República Federativa do Brasil, Brasília/DF, 16 maio 2012*. [https://www.planalto.gov.br/ccivil\\_03/\\_ato2011-2014/2012/decreto/d7724.html](https://www.planalto.gov.br/ccivil_03/_ato2011-2014/2012/decreto/d7724.html)
- Brasil. (2015) Lei nº 13.146, de 06 de julho de 2015. *Dispõe sobre a Lei Brasileira de Inclusão da Pessoa com Deficiência*. [https://www.planalto.gov.br/ccivil\\_03/\\_ato2015-2018/2015/lei/l13146.html](https://www.planalto.gov.br/ccivil_03/_ato2015-2018/2015/lei/l13146.html)
- Brasil. (2021). Lei nº 14.129, de 29 de março de 2021. *Princípios, regras e instrumentos para o Governo Digital e para o aumento da eficiência pública*. [https://www.planalto.gov.br/ccivil\\_03/\\_ato2019-2022/2021/lei/l14129.html](https://www.planalto.gov.br/ccivil_03/_ato2019-2022/2021/lei/l14129.html)
- Brasil. (2020). Portaria nº 540, de 8 de setembro de 2020. *Disciplina a implantação e a gestão do Padrão Digital de Governo dos órgãos e entidades do Poder Executivo federal*. <http://dspace.mj.gov.br/handle/1/1632>
- Carvalho, V, Cagnin, M., & Paiva, D. (2017). Avaliação de Acessibilidade de Web Sites de Governos Estaduais do Brasil. In: *Anais do XIII Simpósio Brasileiro de Sistemas de Informação*. SBC, (pp.116-123). <https://sol.sbc.org.br/index.php/sbsi/article/view/6033>
- Cusin, C. A. (2010). Acessibilidade em ambientes informacionais digitais. *Tese (Doutorado) - Universidade Es-*

- tadual Paulista, Faculdade de Filosofia e Ciências. <https://repositorio.unesp.br/handle/11449/103359>
- De Lima Mendes, C., & Ribeiro, S. M. (2017). Inclusão da pessoa com deficiência no ensino superior: um estudo da produção acadêmica na área da educação. *Atos de Pesquisa em Educação*, 12(1), 189-206. <https://proxy.furb.br/ojs/index.php/atosdespesquisa/article/view/5663/0>
- Garcia, R. A. B., Bacarin, A. P. S., & Leonardo, N. S. T. (2018). Acessibilidade e permanência na educação superior: percepção de estudantes com deficiência. *Psicologia Escolar e Educacional*, 22, 33-40. <https://www.scielo.br/j/pee/a/n9MVpKJ5r7fTknh9rVv9rdc/abstract/?lang=pt>
- Jardim, J. M. (2013). A implantação da lei de acesso à informação pública e a gestão da informação arquivística governamental. *Liinc em Revista*, 9(2). <http://revista.ibict.br/liinc/article/view/3495>
- Ministério do Planejamento, Orçamento e Gestão. (2011). Modelo de acessibilidade. Recomendações de Acessibilidade para a Construção e Adaptação de Conteúdos do Governo Brasileiro na Internet. *Departamento de Governo Eletrônico, Secretaria de Logística e Tecnologia da Informação, Documento de Referência*, v. 3.0. <https://emag.governoeletronico.gov.br/>
- Monte de Camargo, A. M., & Martins Araújo, I. (2018). Expansão e interiorização das universidades federais no período de 2003 a 2014: perspectivas governamentais em debate. *Acta Scientiarum: Education*, 40(1). <https://periodicos.uem.br/ojs/index.php/ActaSciEduc/article/view/37659>
- Rangel, T. R. (2023). (Re)pensando a universalidade do acesso nos arquivos públicos: a acessibilidade como uma ferramenta inclusiva para a garantia da cidadania. Tese (Doutorado em Ciência da Informação) – Programa de Pós-graduação em Ciência da Informação da Universidade Federal Fluminense. *Niterói: UFF*. 412 p. <https://app.uff.br/riuff/handle/1/29767>
- Rabello, R. (2022). *Práticas documentárias em regimes de materialidade*. <https://brapci.inf.br/index.php/res/v/200934>
- Resende, A. P. C., & Vital, F. M. de P. (Eds.). (2008). A Convenção sobre Direitos das Pessoas com Deficiência Comentada. Brasília: Secretaria Especial dos Direitos Humanos. *Coordenadoria Nacional para Integração da Pessoa Portadora de Deficiência*. <https://www.gov.br/governodigital/pt-br/acessibilidade-digital/convencao-direitos-pessoas-deficiencia-comentada.pdf>
- Ritter, E., & Roque, T. (2016). Acessibilidade e informação: a disparidade entre desenvolvimento tecnológico, leis e adaptações dos grandes portais brasileiros. *Revista Observatório*, 2(2), 360-379. <https://sistemas.uft.edu.br/periodicos/index.php/observatorio/article/view/1743/>
- Santos, L. L. dos. (2022). *Arquivos públicos brasileiros e a Agenda 2030 da Organização das Nações Unidas: proposta de incorporação dos objetivos de desenvolvimento sustentável*. Dissertação (Mestrado em Ciência da Informação) - Programa de Pós-Graduação em Ciência da Informação da Universidade Federal de Santa Catarina, Centro de Ciências da Educação. UFSC 226p. <https://repositorio.ufsc.br/handle/123456789/244012>
- Sassaki, R. K. (2009). Inclusão: acessibilidade no lazer, trabalho e educação. *Revista Nacional de Reabilitação (Reação)*, São Paulo, Ano XII, p. 10-16.
- Silva, D. W. da, & Baldissera, R. (2021). Comunicação organizacional e interesse público: estratégias de (in) visibilidade nas mídias sociais. *Intecom: Revista Brasileira de Ciências da Comunicação*, 44, 157-174. <https://www.scielo.br/j/intercom/a/8GpqPkGVmbGMmsnGCMhxyDM/abstract/?lang=pt>
- United Nations Organization. (2015). *Transforming our world: 2030 agenda for sustainable development report*. <https://brasil.un.org/sites/default/files/2020-09/agenda2030-pt-br.pdf>
- Zammataro, A. F. D., de Albuquerque, A. C. (2021). Os conceitos de informação, documento e regime de informação a partir da perspectiva Frohmanniana na Ciência da Informação: uma revisão sistemática da literatura em periódicos brasileiros. *RDBCI: Revista Digital de Biblioteconomia e Ciência da Informação*, 19, e021008-e021008. <https://brapci.inf.br/index.php/res/v/158541>

**Appendix A. Federal Higher Education Institutions (IFES) included in the study**

- FRB – Universidade Federal do Recôncavo baiano (Bahia)
- IFRN - Instituto Federal de Educação, Ciência e Tecnologia do Rio Grande do Norte (Rio Grande do Norte)
- UNILAB - Universidade da Integração Internacional da Lusofonia Afro-Brasileira (Bahia/ Ceará)
- UFCA – Universidade Federal do Cariri (Ceará)
- IFPI - Instituto Federal de Educação, Ciência e Tecnologia do Piauí (Piauí)
- IFBAIANO - Instituto Federal de Educação, Ciência e Tecnologia Baiano (Bahia)
- UFMA - Universidade Federal do Maranhão (Maranhão)
- UFRN – Universidade Federal do Rio Grande do Norte (Rio Grande do Norte)
- IFAL - Instituto Federal de Educação, Ciência e Tecnologia de Alagoas
- UFOB - Universidade Federal do Oeste da Bahia (Bahia)
- IFS - Instituto Federal de Educação, Ciência e Tecnologia de Sergipe. (Sergipe)
- UFBA - Universidade Federal da Bahia (Bahia)
- UNIVASF - Universidade Federal do Vale do São Francisco (Pernambuco)
- UFRSA - Universidade Federal Rural do Semi-árido (Rio Grande do Norte)
- IFCE - Instituto Federal de Educação, Ciência e Tecnologia do Ceará (Ceará)
- UFPE – Universidade Federal de Pernambuco (Pernambuco)
- UFRPE - Universidade Federal Rural de Pernambuco (Pernambuco)
- IFPB - Instituto Federal de Educação, Ciência e Tecnologia da Paraíba (Paraíba)
- UFAL - Universidade Federal de Alagoas (Alagoas)
- UFPB – Universidade Federal da Paraíba (Paraíba)
- IF Sertão - Instituto Federal de Educação, Ciência e Tecnologia do Sertão de Pernambuco (Pernambuco)
- IFPE - Instituto Federal de Educação, Ciência e Tecnologia de Pernambuco (Pernambuco)
- UFS - Universidade Federal de Sergipe (Sergipe)
- UFC - Universidade Federal do Ceará (Ceará)
- IFBA - Instituto Federal de Educação, Ciência e Tecnologia da Bahia (Bahia)
- UFPI - Universidade Federal do Piauí (Piauí)
- UFCG - Universidade Federal de Campina Grande (Paraíba)
- IFMA - Instituto Federal de Educação, Ciência e Tecnologia do Maranhão (Maranhão)