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Analysis Of Web Accessibility To Meet The Needs Of Students With Disabilities, Case Study Directorate Of Postgraduate And Continuing Education Of The State University Of Bolívar

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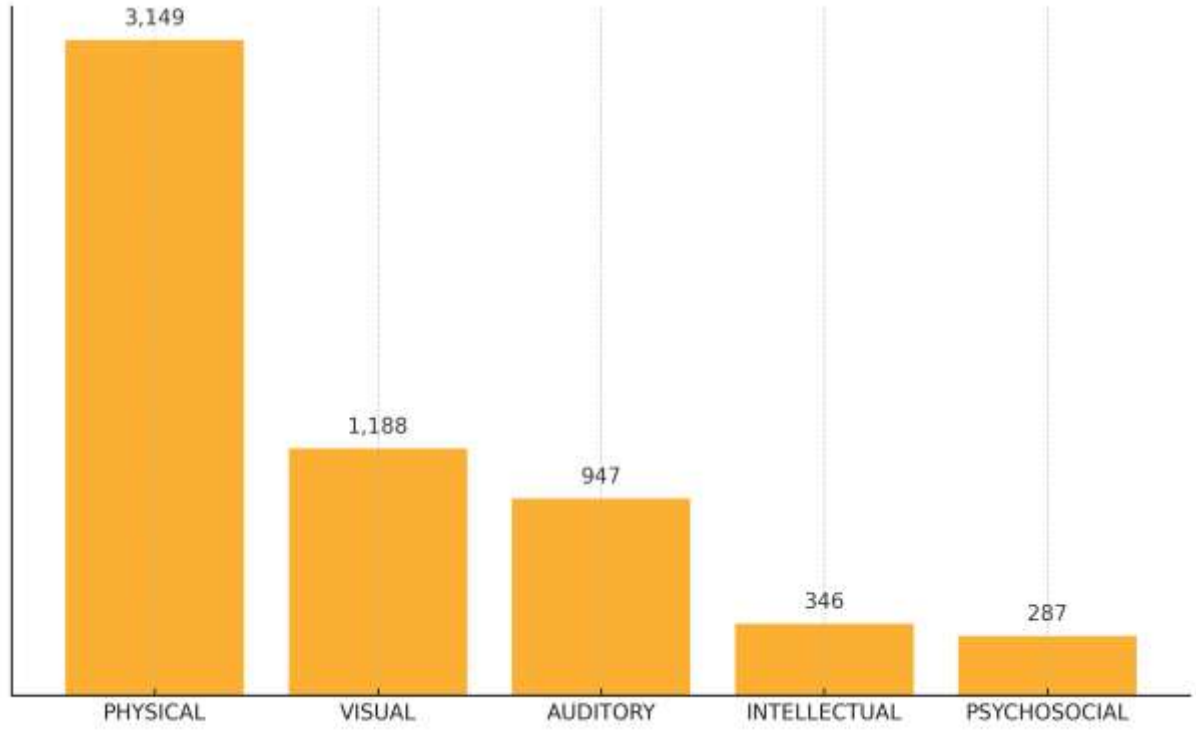
Summary

Web accessibility in universities is not only an ethical and legal obligation, but also contributes to the creation of a more inclusive, diverse and equitable educational environment, in this sense this article describes a current analysis of the accessibility to portals and web resources of the Directorate of Postgraduate and Continuing Education of the State University of Bolívar – Ecuador. The evaluation has been carried out by checking the opinion of students with disabilities and the technical analysis of compliance with the Web content accessibility guidelines established by the World Wide Web Consortium in WCAG recommendation 2.1. Unfortunately, the results show that the University has partially accessible websites; that is, many of the technologies developed by the HEI do not meet the standards and guidelines of accessibility and usability, limiting access to information, communication and quality in learning, as well as personal autonomy, especially for students with visual and hearing disabilities. This initial result will provide the guidelines for the development of more accessible systems that allow access to all students regardless of whether they have a disability, in this way it is framed in Sustainable Development Goal 4 of the 2030 Agenda, inclusive and quality education is guaranteed, providing the same opportunities to students in the different master's programs in the Graduate and Continuing Education Directorate of the State University of Bolívar

INTRODUCTION

Web accessibility, particularly in the academic setting of universities, should be interpreted holistically as the degree of convenience and ease with which individuals, including students, regardless of whether they have disabilities or not, as well as members of the general public, can effectively use, perceive, understand, navigate, and interact with the various forms of information and web services that are available online. Consequently, the empirical data accumulated in our nation indicate that there is a cumulative total of 480,776 people who are officially registered as people with some type of disability (National Council for Disability Equality, 2024), which encompasses a variety of physical, intellectual, hearing, visual and psychosocial disabilities, and among these individuals, there are specifically 5919 university students who are enrolled in various higher education institutions throughout Ecuador and who, due to their disabilities, encounter significant barriers that impede their ability to virtually access information and communication resources, These disabilities are shown in Figure 1.

Figure 1 Students by type of disability



It is evident with the growth of student demand that the number of students with some type of disability has also increased, since the enrollment history shows in 2015 a total of 5904 and in 2020 5919, these data demonstrate the need for universities to respond to all these students who require certain facilities to achieve a quality education in the same conditions and facilities (Bosquez-Barcenes et al., 2019).In Ecuador, numerous initiatives and systematic efforts have been undertaken to improve the overall state of web accessibility; for example, in 2014, the Ecuadorian technical standard known as NTE INEN ISO/IEC 40500 was formally published, along with the Ecuadorian technical regulation RTE INEN 288 entitled "Accessibility of web content", which was published in January 2016, and these regulations collectively delineate the specific accessibility requirements that must be adhered to by web content to ensure that it is usable by all people, regardless of their disability status, whether they choose to surf the web independently or using the right technology support products (Navarrete & Luján-Mora, 2014). The aforementioned standards were mandated to be implemented on the websites of public and private sector entities that provide public services, and the entry into force of these requirements began on August 8, 2016 (Campoverde-Molina et al., 2019).Within the framework of the INEN-ISO/IEC 40500 standard of the NTE, a particularly prominent aspect is the stipulation that all websites of public institutions, which explicitly include universities, must fully comply with the level of accessibility designated as AA (Manjarres Jínez, 2022). Furthermore, within this same regulatory framework, the first transitional provision sets a two-year deadline for the adaptation of existing websites to comply with the "A" compliance level, while the subsequent transitional provision specifies that higher education institutions will have a duration of four years to ensure that their current websites comply with the stricter "AA" compliance level (Cruz et al., 2016).In this context, it is evident that the deadlines established by both the Ministry of Industries and Productivity and the Undersecretariat for Quality have already been satisfactorily met in relation to the "A" compliance level, and it should be noted that, on average, there is approximately one year left before higher education institutions are obliged to comply with the "AA" compliance level on a mandatory basis (Naranjo-Villota et al., 2020). Consequently, the objective of the research is to determine the current state of compliance with respect to the conditions of the websites belonging to Ecuadorian universities (Acosta et al., 2017).

In the realm of web accessibility and the associated set of accessibility guidelines, scholars such as Acosta & Luján-Mora (2017) They articulate the concept of web accessibility as the ability for a web-based product or service to be accessed and used by as many people as possible, regardless of the specific limitations that a person may possess or those arising from the particular context in which the service is employed.In recent years, these guidelines have been subject to revisions, in which the Web Accessibility Guidelines 1.0 represent a recommendation dated May 5, 1999, issued by the W3C, which clarifies methodologies for improving the accessibility of web content for people with disabilities (W3C Issues Recommendation for Web Content Accessibility Guidelines 1.0, 1999). These guidelines were designed specifically for web developers and developer tool creators; Within the framework of the accessibility guidelines, a total of 14 guidelines are outlined, which embody the fundamental principles of accessible design.Subsequently, on 11 December 2008, the WCAG 2.0 accessibility guidelines were introduced, covering a wide range of recommendations aimed at improving the accessibility of web content for people with disabilities, including provisions for people who are blind or have low vision, as well as for people who are deaf, hard of hearing, limited mobility, speech problems, photosensitivity and combinations thereof; In addition, certain accommodations are made for learning disabilities and cognitive limitations (W3C, 2018). WCAG 2.0 guidance levels are proposed in the following categories: general principles, accessibility guidelines, and verifiable compliance criteria.In this sense, four fundamental principles of accessibility are articulated: perceptible, operable, understandable and robust, according to which the guidelines are listed in a total of 12 criteria that authors must meet to produce more accessible content for users with various disabilities; ultimately, each guide outlines verifiable compliance criteria that facilitate the application of WCAG 2.0 at three levels of compliance: A "lowest", AA, and AAA "highest" (W3C, 2009). Finally, the Web Content Accessibility Guidelines (WCAG) 2.1 represent the most recent version of the Web Content Accessibility Guidelines published by the World Wide Web Consortium (W3C). On June 5, 2018, the final recommendation was released following a development process that lasted nearly a decade since the publication of the Web Content Accessibility Guidelines 2.0 on December 11, 2008 (Campoverde-Molina et al., 2023).On the contrary, the accessibility of information and web services provided by public and private higher education institutions (HEIs) in Ecuador has undergone significant transformations since the inception of the World Wide Web (WWW), a development attributed to Tim Berners-Lee (Segarra-Faggioni & Campoverde, 2017). Over the years, these institutions have formulated a large number of guidelines and standards that must be meticulously taken into account during the website development process. Consequently, the Internet has become an essential technological tool to execute various activities, such as information retrieval, financial transactions, purchases, among others, activities that are fundamentally simple for the majority of the population; However, for people with disabilities (including hearing, visual, physical, cognitive, and mental impairments) or older people (whose abilities may decline with age), they present significant obstacles (Delgado et al., 2023).The research carried out by (Acosta et al., 2017; Bosquez-Barcenes et al., 2019; Campoverde-Molina et al., 2023; Cruz et al., 2016) They indicate that, despite the existence of state-level accessibility standards for web content, the results are not as expected. This is evidenced by the fact that almost all university web portals in Ecuador, with some commendable exceptions, do not comply with the WAI guidelines, which reveals that none of the web pages evaluated are accessible and that they have not been designed with the needs of users with disabilities in mind. Consequently, this presents an immediate imperative for designers, educators, and developers of web environments and systems to improve their understanding of accessibility requirements and implement mechanisms that facilitate the use of assistive technologies (Delgado et al., 2023).In this context, it is imperative to underline the importance of universities within the Graduate Directorate to maintain accessible websites (Acosta-Vargas et al., 2018). In contemporary society, there is a considerable population of university students with disabilities who opt for blended or online learning modalities, this fact occurs more frequently in Postgraduate since the vast majority work and cannot carry out their fourth-level training process in person, since they find it difficult to travel or participate in face-to-face classes of more than an hour (Barfi, 2018). In addition, higher education institutions' web portals serve as crucial platforms for direct engagement with this priority demographic, serving as repositories of all pertinent information, including academic programs, events, procedural guidelines, and services such as pre-registration, registration, administrative consultations, and library or

laboratory resource reservation (Ortner & Miesenberger, 2005). In addition, they provide content, resources, activities, and other information of social relevance, so it is necessary that an accessible website allows all people with permanent or temporary disabilities to interact with these resources (Bailey & Pearson, 2010). On the contrary, the absence of accessible websites results in the exclusion of a significant number of people, which infringes on their universal right to equal access to information and education, as articulated in the United Nations convention (Seale, 2013).Therefore, the main objective of the research was to meticulously evaluate and determine the extent to which university technologies and web portals are accessible, with the overall goal of facilitating and promoting the effective inclusion of students with disabilities in higher education institutions in the country of Ecuador. In order to comprehensively address and satisfy these research objectives, the following pertinent research questions were formulated and articulated: RQ1. To what extent do students with disabilities perceive their access to the technologies of the Graduate Directions of higher education institutions?, and RQ2. What is the current level of compliance with the Web Content Accessibility Guidelines (WCAG), version 2.0, as it relates to accessibility, particularly in relation to the challenges faced by individuals in terms of visual impairment and comprehension difficulties, as well as the limitations imposed by the age and status of members of the academic community of the Graduate Directions?

II. MATERIALS AND METHODS

For the analysis of website accessibility, the content analysis technique was used through the website evaluation methodology established by WCAG 2.0, which included the evaluation of 27 websites. Because many institutional websites of the Universities contained https credentials and security protocols, it was impossible to analyze all HEIs. The methodology of the evaluation of the websites comprised five phases that include phases and activities and that started from: 1) definition of the scope of the evaluation, 2) exploration of the website, 3) selection of the population or sample, 4.) auditing the website and 5.) Record the results (W3C, 2018). The scope of the evaluation included 21 web portals of universities between public and private, the evaluation focused on the main page of Postgraduate because within it is all the information of said dependency. In addition, it was defined to assess the level of conformity (AA) that it achieves in the standards defined by WCAG 2.0.The technology selected to carry out the evaluation of website accessibility was eXaminator, which is a validated and most frequently used tool (Díaz et al., 2017), it is also an online software that offers the evaluation service automatically to a web page, this technology takes as a reference the WCAG 2.0 accessibility guidelines, after analyzing the website simply with its URL it shows a weighting from 1 to 10, on the other hand it shows a detailed report of the number of tests performed, adjusting the rating to value judgments: very bad, bad, fair, good, very good and excellent (Berland et al., 2001).

III. RESULTS AND DISCUSSION

As indicated above, the instrument chosen for the evaluation of institutional websites was Examinator, which is an online computational tool that autonomously assesses the accessibility of a web page, using the Web 2.0 Content Accessibility Standards (WCAG 2.0) as a reference point. eXaminator assigns a score ranging from 1 to 10 as a quick indicator of the accessibility of web pages and provides a complete report of the evaluations carried out.

Table 1 Web accessibility score on the Universities' graduate page

Name	URL	Score	Nº tests	Excellent	Regular	Be	Too bad
Armed Forces University	https://ugp.espe.edu.ec/posgrados/	7.2	14	10	2	1	1
Polytechnic School of the Litoral	https://postgrados.espol.edu.ec	5.4	22	11	2	6	3
Simón Bolívar Andean University	https://www.uasb.edu.ec/programa/	5.5	24	8	4	6	6

Espiritu Santo University	https://uees.edu.ec/postgrado/	6.8	23	11	4	4	4
Universidad San Francisco de Quito	http://www.usfq.edu.ec	7.4	22	12	5	3	2
Milagro State University	https://www.unemi.edu.ec/index.php/maestrias/	6.4	24	10	5	5	4
Casa Grande University	https://www.casagrande.edu.ec/posgrado/	5.6	22	7	5	8	2
Central University	https://www.uce.edu.ec/web/posgrado	7.5	19	12	3	2	2
State Polytechnic University of Carchi	https://posgrados.upec.edu.ec	5.2	25	12	5	5	3
University of Guayaquil	https://vigcyp.ug.edu.ec/posgrado_inicio/	5.3	31	15	5	3	8
University of Azuay	https://posgrados.uazuay.edu.ec	5.6	24	10	5	5	4
Universidad Técnica del Norte	https://posgrado.utn.edu.ec	4.9	29	10	4	6	9
Indo-American University	https://www.indoamerica.edu.ec/admisiones-posgrado-indoamerica/	5.9	24	10	1	6	7
Technical University of Ambato	https://posgrado.uta.edu.ec/v4.0/	4.8	23	7	2	6	8
State Technical University of Quevedo	https://www.uteq.edu.ec/es/posgrado	4.5	27	6	3	4	10
ECOTEC University	https://online.ecotec.edu.ec/posgrado/	5.2	24	9	4	3	8
Technical University of Cotopaxi	https://posgrado.utc.edu.ec	5.1	23	8	6	4	5
University of Otavalo	https://www.uotavalo.edu.ec/admisiones-posgrado/	5.3	28	11	5	6	6
University of the Pacific	https://web.upacifico.edu.ec/oferta-academica/maestrias-presenciales-2/	4.8	28	9	2	7	9
National University of Chimborazo	https://posgradovirtual.unach.edu.ec	6.9	17	11	2	1	3
State University of Bolívar	https://www.ueb.edu.ec/index.php/oferta-academica/posgrado	5.9	22	10	2	3	7

Table 2 Web accessibility score by limitation

Number	**URL**	**Score**	**Limitations**			
			See	**Upper limbs**	**Understand**	**Age-related**
Armed Forces University	https://ugp.espe.edu.ec/posgrados/	7.2	7.5	7,2	6,4	8,5

Polytechnic School of the Litoral	https://postgrados.espol.edu.ec	5.4	5.4	5,4	5,3	5,7
Simón Bolívar Andean University	https://www.uasb.edu.ec/programa/	5.6	5,9	5,1	4,7	5,8
Espiritu Santo University	https://uees.edu.ec/postgrado/	6.8	6,7	5,8	5,9	6,7
Universidad San Francisco de Quito	http://www.usfq.edu.ec	7.4	6,7	5,8	7,7	7,8
Milagro State University	https://www.unemi.edu.ec/index.php/maestrias/	5.8	5,9	6,0	5,8	6,7
Casa Grande University	https://www.casagrande.edu.ec/posgrado/	5.4	5,8	4,9	5.4	5,4
Central University	https://www.uce.edu.ec/web/posgrado	7.7	6,7	7,3	7,6	8,6
State Polytechnic University of Carchi	https://posgrados.upec.edu.ec	4.9	5,9	5,1	4,5	5,7
University of Guayaquil	https://vigcyp.ug.edu.ec/posgrado_inicio/	5.2	5.4	4,5	4,4	5,3
University of Azuay	https://posgrados.uazuay.edu.ec	5.5	5,9	5,3	5,7	5,7
Universidad Técnica del Norte	https://posgrado.utn.edu.ec	4.9	4,7	4,7	4,8	5,0
Indo-American University	https://www.indoamerica.edu.ec/admisiones-posgrado-indoamerica/	5.8	5,9	6,7	5,8	5,7
Technical University of Ambato	https://posgrado.uta.edu.ec/v4.0/	4.7	4,8	4,6	4,9	5,6
State Technical University of Quevedo	https://www.uteq.edu.ec/es/posgrado	3.6	3,7	3,2	3,9	3,7
ECOTEC University	https://online.ecotec.edu.ec/posgrado/	4.9	4,9	4,7	4,7	5,6
Technical University of Cotopaxi	https://posgrado.utc.edu.ec	4.8	5,4	5,9	5.3	5,7
University of Otavalo	https://www.uotavalo.edu.ec/admisiones-posgrado/	5.9	5,8	6,4	5,9	5,8
University of the Pacific	https://web.upacifico.edu.ec/oferta-academica/maestrias-presenciales-2/	3.9	4.5	3,4	3,7	4,5
National University of Chimborazo	https://posgradovirtual.unach.edu.ec	4.9	4,9	5	4,7	5,5
State University of Bolívar	https://www.ueb.edu.ec/index.php/oferta-academica/posgrado	4.8	4,7	4,3	3,6	4,9

In general, among all the websites analysed, it is clear that the main problem perceived on websites concerns the limitations of comprehension, which constitute the element that manifests the most important deficiencies in their home page. Subsequently, the limitation that presents a considerable margin of error refers to visual accessibility, while, thirdly, the limitations associated with higher-level navigation are pointed out. Ultimately, the most favorable performance of the evaluated web pages is due to the limitations associated with age-related accessibility, demonstrating the most positive results, as

illustrated in Figure 4, which shows the accessibility responses of the university websites evaluated by type of limitations and categories.Ultimately, it is evident that most of the websites in the Graduate section evaluated do not meet the WCAG 2.0 accessibility standards according to the AA level of compliance, as required by the national regulations summarized in the NTE INEN-ISO/IEC 40500 and the Ecuadorian Technical Regulation RTE INEN 288, both currently in force and mandatory for universities in Ecuador, with notable exceptions such as the University of the Armed Forces, the University of San Francisco de Quito, and the Central University of Ecuador, all of which score above 7 out of 10. On the contrary, some institutions, such as the State Technical University of Quevedo and the Technical University of Cotopaxi, show significantly deficient levels of accessibility and obtain compliance scores below 4 out of 10. In conclusion, the rest of the universities evaluated are positioned within a range that exceeds 4 out of 10, but does not exceed 7 out of 10 in terms of accessibility compliance.

IV. CONCLUSIONS

The examination of web accessibility in relation to the graduate portals of several Ecuadorian universities clarifies that, despite the progress made by certain institutions in the adoption of accessible practices, most of the websites evaluated do not fully comply with the accessibility guidelines of WCAG 2.0, level AA. This underscores the deep gaps in digital inclusion in the field of higher education in Ecuador.Universities that show superior performance, such as the University of the Armed Forces, the University of San Francisco de Quito, and the Central University of Ecuador, which scored above 7 out of 10, exemplify the feasibility of providing more inclusive and accessible web portals. On the contrary, many other institutions have considerable shortcomings, with some scoring below 4 out of 10, underscoring the urgent need to improve their digital infrastructures to adequately accommodate students with disabilities.These findings underscore the imperative need to implement stronger institutional policies that are dedicated to web accessibility, not only to comply with existing legal mandates, but also to ensure that all students, regardless of ability, have equitable access to educational information and resources. Only through a coherent and sustained initiative aimed at improving web accessibility will universities be able to meet Sustainable Development Goal 4 of the 2030 Agenda, which calls for high-quality, inclusive education for all.

1. **BIBLIOGRAPHY**
2. Acosta, T., & Luján-Mora, S. (2017). Analysis of the accessibility in websites of Ecuadorian universities of excellence. UTE Approach, 8, 46-61. https://doi.org/10.29019/enfoqueute.v8n1.133
3. Acosta, T., Luján-Mora, S., Acosta, T., & Luján-Mora, S. (2017). Analysis of the accessibility of the websites of Ecuadorian universities of excellence. UTE Approach, 8, 46-61. https://doi.org/10.29019/enfoqueute.v8n1.133
4. Acosta-Vargas, P., Luján-Mora, S., Acosta, T., & Salvador-Ullauri, L. (2018). Toward a Combined Method for Evaluation of Web Accessibility. En Á. Rocha & T. Guarda (Eds.), Proceedings of the International Conference on Information Technology & Systems (ICITS 2018) (pp. 602-613). Springer International Publishing. https://doi.org/10.1007/978-3-319-73450-7_57
5. Bailey, C., & Pearson, E. (2010). An educational tool to support the accessibility evaluation process. Proceedings of the 2010 International Cross Disciplinary Conference on Web Accessibility (W4A), 1-4. https://doi.org/10.1145/1805986.1806003
6. Barfi, K. A. (2018). Accessibility and postgraduate students use of electronic resources in University of Cape Coast. http://ir.ucc.edu.gh/jspui/handle/123456789/4129
7. Berland, G., Marc, E., & Morales, L. (2001). Health Information on the Internet: Accessibility, Quality, and Readability in English and Spanish. https://jamanetwork.com/journals/jama/article-abstract/193864
8. Bosquez-Barcenes, V. A., Durango, R. D. P., Fierro-Saltos, W. R., & Pacheco-Mendoza, S. R. (2019). Analysis of web accessibility in Ecuadorian universities to meet the needs of students with disabilities. Revista de Investigación Enlace Universitario, 18(1), Article 1. https://doi.org/10.33789/enlace.18.52
9. Campoverde-Molina, M., Luján-Mora, S., & Valverde, L. (2019). Web accessibility analysis of universities and polytechnic schools in Ecuador applying the NTE INEN ISO/IEC 40500:2012 standard. http://rua.ua.es/dspace/handle/10045/99754
10. Campoverde-Molina, M., Luján-Mora, S., & Valverde, L. (2023). Web accessibility analysis of the universities and polytechnic schools of Ecuador applying the standard nte inen iso/iec 40500:2012. http://dspace.uib.es/xmlui/handle/11201/161362
11. National Council for Disability Equality. (2024). Disability Statistics – National Council for Disability Equality. Disability Statistics. https://www.consejodiscapacidades.gob.ec/estadisticas-de-discapacidad/
12. Cruz, N. K. E., Acosta, Z. M., & Torres, H. G. (2016). Web Accessibility in Higher Education Institutions in Ecuador: Year 2016. Journal of Science and Research, 1(CITT2016), Article CITT2016. https://doi.org/10.26910/issn.2528-8083vol1issCITT2016.2016pp44-48
13. Delgado, P. E. A., Macías, V. B. C., Cedeño, A. A. C., & Zambrano, W. A. P. (2023). Usability and accessibility in websites, current situation in Ecuadorian Universities. Mikarimin. Multidisciplinary Scientific Journal, 9(1), Article 1.

14. Díaz, F. J., Schiavoni, A., Osorio, A., Amadeo, A. P., Harari, I., & Ray, D. (2017). Fixing Accessibility Issues in Open-Source Teaching Repositories. CLEI Electronic Journal, 20(3), Article 3. https://doi.org/10.19153/cleiej.20.3.9
15. Manjarres Jinez, P. A. (2022). Application manual of the NTE INEN-ISO/IEC 40500 Standard for accessible web interfaces. https://repositorio.puce.edu.ec/handle/123456789/7135
16. Naranjo-Villota, D., Guaña-Moya, J., Acosta-Vargas, P., & Muirragui-Irrazabal, V. (2020). Evaluation of web accessibility in accredited institutes of higher education in Ecuador. ESPACIOS Magazine, 41(04). https://www.revistaespacios.com/a20v41n04/20410405.html
17. Navarrete, R., & Luján-Mora, S. (2014). Web accessibility in the Universities of Ecuador. Preliminary analysis. http://rua.ua.es/dspace/handle/10045/50391
18. Ortner, D., & Miesenberger, K. (2005). Improving Web accessibility by providing higher education facilities for Web designers and Web developers following the design for all approach. 16th International Workshop on Database and Expert Systems Applications (DEXA'05), 866-870. https://doi.org/10.1109/DEXA.2005.113
19. Seale, J. (2013). E-learning and Disability in Higher Education: Accessibility Research and Practice (2.ª ed.). Routledge. https://doi.org/10.4324/9780203095942
20. Segarra-Faggioni, V., & Campoverde, J. (2017). Evaluation of the web accessibility of university web portal: Case Study: Universidad Tecnica Particular de Loja. Proceedings of the 9th International Conference on Education Technology and Computers, 203-206. https://doi.org/10.1145/3175536.3175546
21. W3C. (2018). Web Content Accessibility Guidelines (WCAG) 2.1. https://www.w3.org/TR/WCAG21/
22. W3C Issues Recommendation for Web Content Accessibility Guidelines 1.0. (1999, mayo 5). W3C. https://www.w3.org/news/1999/w3c-issues-recommendation-for-web-content-accessibility-guidelines-1-0/