RESEARCH/INVESTIGACIÓN

UNIVERSITY WEBSITES FOR ACADEMIC AND RESEARCH VISIBILITY

Sedes webs de las universidades cubanas. Análisis de su presencialidad en internet

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ABSTRACT

This research presents an analysis of the websites of 20 Cuban universities attached to the Ministry of Higher Education (MES) of Cuba. Its design is based on the construction of the analytical representation of four fundamental dimensions: content, appearance, accessibility, and SEO positioning. The essential objective of the work is to analyze the state of the websites of Cuban universities. To do this, we proceed to the definition and application of a group of indicators that will allow us to analyze the content, appearance, accessibility, and SEO positioning respectively. Based on the scientific literature on digital communication management and, specifically, on the management of university websites, these indicators and a series of parameters were defined that made it possible to evaluate the current situation of the Cuban university. This study on Cuban university websites shows not very encouraging results in

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content management and, above all, deficiencies in communication and dissemination of the functions of these centers, as institutions that link teaching and research with social development.

KEYWORDS: communication – Cuban universities - accessibility - visibility - websites - contents - society - positioning – SEO

RESUMEN

Esta investigación presenta un análisis de las sedes web de 20 universidades cubanas adscritas al Ministerio de Educación Superior (MES) de Cuba. Su diseño está basado en la construcción de la representación analítica de cuatro dimensiones fundamentales: contenido, apariencia, accesibilidad y posicionamiento SEO. El objetivo esencial del trabajo es analizar el estado de los sitios webs de las universidades cubanas. Para ello, se procede a la definición y aplicación de un grupo de indicadores que nos permitirá analizar los contenidos, la apariencia, la accesibilidad y posicionamiento SEO respectivamente. Con base en la literatura científica sobre gestión de la comunicación digital y, de manera específica, sobre la gestión de sedes webs universitarias, se definieron esos indicadores y una serie de parámetros que permitieron evaluar la situación actual de la universidad cubana. Este estudio en las sedes web universitarias cubanas evidencia resultados no muy alentadores en la gestión de contenidos y, sobre todo, deficiencias sobre la comunicación y difusión de las funciones de estos centros, como instituciones que vinculan la docencia e investigación con el desarrollo social.

PALABRAS CLAVE: comunicación – universidades cubanas – accesibilidad - visibilidad - sedes web – contenidos – posicionamiento – SEO.

SEDES WEBS DAS UNIVERSIDADES CUBANAS. ANÁLISE DA SUA PRESENÇA NA INTERNET

RESUMO

Esta pesquisa apresenta uma análise das sedes web de 20 universidades cubanas inscritas no Ministério de Educação Superior (MES) de Cuba. Sua estrutura está baseada na construção da representação analítica de quatro dimensões fundamentais: conteúdo, aparência, acessibilidade e posicionamento SEO. O objetivo essencial do trabalho é analisar o estado dos sítios webs das universidades cubanas. Para isto se procede à definição e aplicação de um grupo de indicadores que permite analisar os conteúdos a aparência, a acessibilidade e o posicionamento SEO respectivamente. Baseando-se na literatura científica sobre gestão de comunicação digital, e de forma específica sobre a gestão das sedes webs universitárias, se definiram estes indicadores e uma série de parâmetros que permitiram analisar a situação atual da universidade cubana. Este estudo nas sedes webs universitárias revela resultados não muito alentadores na gestão de conteúdos e principalmente deficiências sobre a comunicação

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e difusão das funções destes centros como instituições que vinculam a docência e a pesquisa com o desenvolvimento social.

PALAVRAS CHAVE: comunicação – universidades cubanas – acessibilidade - visibilidade - sedes web – conteúdos – posicionamento – SEO.

Translation by **Paula González** (Universidad Católica Andrés Bello, Venezuela)

1. INTRODUCTION

The web reflects the recognition of any institution in the digital environment and society is increasingly consuming these environments. Therefore, both processes, recognition and consumption, are more than enough reasons for institutions to have a correct content program that satisfies their users. Users are defined as people who, from the university or outside of it, socialize its contents, their teaching "work", and university missions. In the study by the author Tania Blanco Sánchez (2014) she defines that universities are made up of different interest groups or stakeholders, the sum of these groups being the structure of the map of university audiences. (Blanco Sánchez, 2014, p. 36). University stakeholders can be diverse, and it is the responsibility of each university to define its own audience map. In general, they are structured by the different teaching and student groups, by career and by faculties, as well as administrative officials. Without losing sight of the relatives of each of these audiences and the external institutions that collaborate with many universities.

From the academic level, there are many institutions, especially universities as higher-level education institutions, that have designed their websites, benefiting or not the interested community or the stakeholders themselves. In a research piece on the websites of Spanish universities, academics Mike Thelwall and Isidro F. Aguillo state that these spaces reflect "academic and non-academic purposes" (2003, p. 292). This is closely related to the field of international collaboration and its relationship with research. The virtual space greatly favors the development of research and exchanges; compelling reason for academics to know the uses of the web and how they can establish links through it. "It is clear, however, that in some countries the Web is comparatively underused (…)" (Thelwall and Aguillo, 2003, p. 292).

1.1. University websites

Websites are a digital tool that allows universities to create and generate documentary units based on their content, which can be differentiated institutionally. For this, it is necessary to base themselves on the architecture of the digital information that they develop to expose their university activities, such as teaching, research, and extracurricular activities also called university extension. For the scientific environment, the term "website" refers to a unitary set of web pages (Ramos Vielba and Clabo Clemente, 2008, p. 365). Similarly, due to the developed research mode,

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websites are identified as a set of web pages with a specific URL, which is internally connected with other links and that, from the home page, the sum of all of them identifies universities. This is why many reasons defend the idea of analyzing the websites of Cuban universities, due to the need to know if they currently meet the requirements on the efficient use of the tool, as well as their maximum performance and if they could improve in terms of their management.

Another important point to take into account, focused on the correct management of university websites, is the possibility that they provide to any user to approach scientific and teaching activity, as well as the space that universities have to make their functions and objectives visible. That is why it is necessary to stop seeing websites as an instrument only for institutional image and to begin to make these spaces visible as a tool that supports university management and benefits the University-Society relationship. To a certain extent, they are the updated version of having virtual centers, which makes it possible to develop the visibility and digital reputation of educational centers. According to researchers Isidro F. Aguillo and Begoña Granadino:

> The presence of academic institutions, and especially universities, on the Web, can generate very useful information for the evaluation of their academic and research activities, including not only those that generate formal production, through articles and publications but also those that transmit knowledge in a more informal way (2006, p. 68).

In recent decades, thanks largely to the achieved technological development, the evaluation of scientific activity has also been *in crescendo*. This boom is essentially related to the way and procedures to compare and reward the academic and research environment. In this scenario, the use of bibliometrics as an evaluative method stands out, which "has proven to be valid for measuring the formal results of research activity, generally articles published in prestigious journals and specialized monographs" (Aguillo and Granadino, 2006, p. 69). To the extent that virtual space is increasingly universal and omnipresent, it becomes an imperative need for educational institutions and centers, especially those for university education, to have their own. This becomes a presentation medium and a space for communication with their audiences -internal and external-, as well as an instrument to disseminate educational and scientific production.

1.2. Why and what do we want to evaluate?

One possible answer to "Why?" is that as the internet grows, and with it the multiple contents exposed in this space, it is necessary to design criteria to identify and recognize quality information and, of course, contents that generate motivation and satisfy users' search.

Since the 2000s, some websites generate digital resources for the theoretical foundation of academics and university students, as well as companies that developed databases, information consultancies, publishing systems, and media that created their

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own databases to generate a service to their clients (Codina, 2000, p. 13). Today, in 2021, there is a lot of content exposed and especially from various sources of information, which generate publications on the same topic and various analyzes. Such is the case that, for this research, in the search for indicators to measure websites, antecedents on this line of research were found in authors such as Codina (2000), Aguillo and Granadino (2006), Tardío-Crespo and Álvarez-Álvarez (2018), and Jiménez and Ortiz-Repiso (2007), who propose models and guidelines for the evaluation of websites to apply academic techniques that could guide verifiable and coherent criteria. Some of the criteria were influenced by other evaluation models currently applied in American universities. These criteria focus on content analysis, access, browsing, and design of the websites.

In the mid-nineties, the discipline of Cybermetrics was born, which includes study methods on the quantitative aspects of the construction and use of information resources, structures, and technologies on the web from bibliometric and computer perspectives, defined as Webmetrics (Ramos Vielba and Clabo Clemente, 2008, p. 368). All of the above happens due to the immense existing digital documentation and the need to filter, certify, and prove that the sources and content are of quality.

Taking into account the above, in response to the question "What do we want to evaluate?", the need to evaluate the websites of Cuban universities prevails, to identify the unnecessary noise of the content, which is often generated, as well as to know the graphic contribution, the ease of use, the design, and waiting moment for the website to be opened or found; besides the accessibility, functionality, and purpose that said URL may have. All this leads to a background of identity and a good or bad job of the institution that manages it. That is why many criteria are accumulated to take into account when evaluating the development of the website -even though the evaluation process is the top of an entire content management and design that the institutional website should have.

1.3. Evaluations of the websites of Cuban universities

With the essential purpose of analyzing the websites of higher education centers in Cuba and due to the lack of similar research in the Cuban context, foreign research was taken as essential references, which not only emerged from the educational context but which all coincide in analyzing the virtual environment as a space for growth and development.

Authors such as Jiménez Piano (2001) propose the development of an evaluation questionnaire for websites with scientific content, which includes the following criteria: Content, Design, Administration, Accessibility, Audience, Authority, Updating, and Cost. While researchers such as Tardío-Crespo and Álvarez-Álvarez (2018), also carry out a selection of criteria to analyze school websites, synthesizing them in eight specific dimensions: content, organization, browsing, appearance, differentiation, speed, accessibility, and usefulness. The author Eduardo de la Cruz

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Palacios (2015), who evaluates and analyzes the websites of school libraries in Spain, also contributes some elements. To fulfill his objective, he used categories, criteria, parameters, indicators, and sub-indicators that analyze the content, design, browsing, search, and retrieval of information or resources to which access is given in school library websites in Spain.

Once the main references on the variants to analyze and evaluate university websites had been reviewed, the indicators that meet the objective of this research were selected. They respond to the evaluation of content, easy access by users, browsing, expiration of content, visual appearance, as well as the visibility of the web itself in search engines. The fundamental intention is that these criteria respond to the visibility and the creation of a good university reputation and not remain only in the mere digital presence.

Four dimensions were chosen, which lead to the incorporation of indicators that allow giving a value or definition to obtain quantitative results. These dimensions are intended to study in a general way the functionality of the university website for all its audiences -both internal and external- as well as its visibility and positioning, remaining as follows:

1. Content: Relevant information of the institution, such as the address/location, contact channels, registration or section start, institutional newsletter, social networks, institutional blog, administrative documents, downloadable teaching and administrative materials, organizational culture (history, vision, mission), academic and scientific elements, images of the institution and university life, library information and management, etc. For some authors within the analyzed bibliography, these variables must be useful to make the website an efficient place. In line with this, the best webpages are simple and intuitive (Camps et al., 2015; Ng et al., 2003; Poock, 2005 cit. in Tardío-Crespo and Álvarez-Álvarez 2018, p. 50).

2. Appearance: "The image produces attraction or rejection of the page in visitors" (Du Preez, 2007; Regan, 2003; Ng et al., 2003 cit. in Tardío-Crespo and Álvarez-Álvarez, 2018, p. 51). Taking this criterion into account implies the evaluation of design elements, such as the legibility of the information (size, color contrast, justification), the function of each of the elements (images, sounds, text, graphics), and other technical elements (such as design quality, loading and execution time, minimum system requirements, technical and support services, visual coherence, among others) (Camps et al., 2015; Cantabria, 2009; Du Preez, 2007; Ferrer, 2005; Hartshorne et al., 2006, 2008; Romero et al., 2002 cit. in Tardío-Crespo and Álvarez-Álvarez, 2018, p. 51).

3. Accessibility: Ease of access to the page and its information and services must be possible for everyone. "To do this, the *Web Content Accessibility Guidelines (WCAG 2.0) of the Web Accessibility Initiative, the World Wide Web Consortium (W3C)* must be followed" (cit. in Tardío-Crespo and Álvarez-Álvarez, 2018, p. 51-52).

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4. Web SEO: It will measure the SEO positioning and search optimization of the websites of Cuban universities, to offer criteria on their organic visibility in search engine results. For this, the web program https://seowebmas.redcuba.cu/sitiosweb, developed by the Universidad de las Ciencias Informáticas (UCI), of Cuba, is used. This tool analyzes the most important variables (search engine optimization, network traffic optimization, usability and social networks, and web analysis) of web positioning, which influence the visibility of content of the analyzed websites on the Internet.

2. OBJECTIVES

Determine the current status of the websites of Cuban universities as tools at the service of their corporate communication. To achieve this essential purpose, the research has as specific objectives:
1. Identify the main weaknesses in the communication that Cuban universities carry out through their corporate web portals.
2. Establish guidelines for better use of the websites.

3. METHODOLOGY

Cuba has accreditation programs regulated by the Cuban National Accreditation Board (JAN[2] by its acronym in Spanish). However, there are no published documents, in quantitative terms, on the use of the internet and the presence of academics on the web of Cuban universities. This does not detract from the fact that technologies and the computerization of content are a priority for Cuban higher education today, especially in the context imposed by the COVID-19 pandemic. Add to the above that the levels of connectivity on the island have grown. According to figures released by the Cuban Telecommunications Company S. A., ETECSA, in August of last year the country reached four million users connected to the internet via mobile devices (Cubadebate, 2020).

Due to the raised connectivity figures, the existence of the internet for more than a decade, and the current pandemic situation that forces virtual communication, we ask ourselves: How are the websites of Cuban universities used, and what information is obtained through online communication for study or university management itself? To answer this question, we conducted a study of the universities that are attached to the Ministry of Higher Education (MES by its acronym in Spanish) of Cuba and that they respond to a recognized social purpose as Institution of Higher Education (IES by its acronym in Spanish). Once these institutions were identified, we selected 20 Cuban universities, from which data were obtained after applying the analysis of the selected dimensions.

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[2] For more information https://www.mes.gob.cu/es/indicadores-de-calidad.

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The links to each of the universities and their URL location are visible on the MES website itself. The centers are the following: Universidad de Pinar del Río "Hermanos Saíz Montes de Oca" (UPR), Universidad de Artemisa (UA), Universidad Agraria de La Habana "Fructuoso Rodríguez Pérez" (UNAH), Universidad de Ciencias Pedagógicas "Enrique José Varona" (UCPEJ), Universidad de las Ciencias Informáticas (UCI), Universidad de Ciencias de la Cultura Física y el Deporte "Manuel Fajardo" (UCCFD), Universidad Tecnológica de La Habana "José Antonio Echeverría" (CUJAE), Universidad de La Habana (UH), Universidad de Matanzas (UM), Universidad de Cienfuegos "Carlos Rafael Rodríguez" (UCF), Universidad Central "Marta Abreu" de Las Villas (UCLV), Universidad de Sancti Spíritus "José Martí Pérez" (UNISS), Universidad de Ciego de Ávila "Máximo Gómez Báez" (UNICA), Universidad de Camagüey "Ignacio Agramonte y Loynaz" (UC), Universidad de las Tunas (ULT), Universidad de Holguín (UHO), Universidad de Granma (UDG), Universidad de Oriente (UO), Universidad de Guantánamo (UG), Universidad de la Isla de la Juventud "Jesús Montané Oropesa" (UIJ).

To perform the web analysis of the digital sites of the 20 Cuban universities, we based ourselves on the selected dimensions, to which indicators were designed, thus generating a study profile and a "value" was associated with them (table 1), in most cases quantitative. This deployment allowed us to define, with greater precision, the analysis of these virtual spaces. It is important to clarify that, while browsing each of the university websites, the observation method was also applied, which enabled a more qualitative approach. The period is sufficient for the analysis, which was applied in November 2020.

Table 1: Dimensions, indicators, and their definition. Analysis profile for the evaluation of Cuban university websites

Dimension	Indicators	Definition	Methodology
Content	Contact information	User registration: yes/no Email: yes/no Address: yes/no Phone: yes/no Links of interest: yes/no Institutional newsletter: yes/no Social networks: yes/no/which ones Blogs: yes/no	The existence of each of the definitions in the websites that responded to this indicator and the indicated definition was observed.
	Images on the web	Facilities: yes/no University Life: yes/no Other activities and/or events: yes/no	Images were identified that could define the institution and, above all, that were specific to the institution. The value of "yes" was granted if the sought definition was found, and the value of "no" when the information was not present.
	Organizational culture	History: from 0 to 3 Mission and vision: from 0 to 3	In this sense, both are valued with "0" for those websites that do not have any reference to their history, mission, and

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			vision; with "1", those that have mild reference; with "2", those that have introductory length references, but do not go into details, and with "3", those that have complete and updated information on the subsection in question.
	Administrative documents	Announcements/notices: yes/no Document download: yes/no Service hours: yes/no Enrollment information: yes/no	During the browsing, a search for this type of document was carried out, which could cover the consumer's need for information. The value of "yes" was granted if the sought definition was found and the value of "no" when the information was not present.
	Scientific environment	Projects: national: yes/no; international: yes/no; territorial: yes/no Research lines: yes/no Scientific journals: yes/no Study/development centers: yes/no	For the scientific environment, the value of "yes" is given to those who have the information corresponding to the definition, and "no" to those who, even though the variable to be analyzed has been indicated on the website, it is not specified and/or the information is missing.
	Teaching-teachers	Postgraduate degree: yes/no Undergraduate degree: yes/no Distance education: yes/no Faculty: yes/no	For this indicator, the value of "yes" was also given if the sought definition was found and the value of "no" when the information was not available. Not all websites present the information in the same way, so it was decided, to obtain a quantitative result, to have closed "yes or no" answers.
	Services and activities	Center hours: yes/no Academic Services: yes/no Publishing services: yes/no Products: yes/no Library: yes/no News: yes/no University Extension: yes/no Activities: yes/no	For this indicator, the value of "yes" was also given if the sought definition was found and the value of "no" when the information was not available. Not all websites present the information in the same way, so it was decided, to obtain a quantitative result, to have closed "yes or no" answers.
	Update	Yes/no/apparently	This indicator was based on the information on the home page, in the news section, and its dates. A value of "yes" was defined when the website is updated, the value of "no" to indicate that it is not updated, and the value of "apparently" depending on the information found that does not present dates because according to the context, it is defined with an apparent update.
Appearance	Assessment	Score from 1 to 10	In the Appearance section, there is an assessment of 1 to 10, which obeys the following parameters: color contrast, images, sounds, text, graphics, design

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			quality, loading and execution time, visual coherence, among others.
Accessibility	Very accessible	0 to 10 problems	In the Accessibility section, the different sites are analyzed through the online web accessibility analysis page "http://www.tawdis.net". This website belongs to the "CTIC Foundation", the headquarters of the Spanish W3C office, which is one of the entities with the largest number of researchers in this regard. Its analysis tool measures that the web is perceptible, operable, understandable, and robust, and indicates the number of problems it finds in each of these criteria. This will serve to classify the webs as "very accessible" when 0 to 10 problems are detected in total among all the criteria; "Quite accessible", from 11 to 30; "Hardly accessible", from 31 to 90, and "insufficiently accessible", when they are more than 90. To analyze the data, a descriptive statistical analysis of frequency counts was carried out, which has been translated into terms of percentages, having also categorized relevant qualitative information during the study of some of the variables. Evolution method of the authors Tardío-Crespo and Álvarez-Álvarez (2018, p. 51).
	Quite accessible	11 to 30 problems	
	Hardly accessible	31 to 90 problems	
	Insufficiently accessible	More than 90 problems	
Web SEO Positioning	High visibility	0 to 3 problems	In the Web SEO Positioning section, the website "https://seowebmas.redcuba.cu/sitiosweb" was used, created and developed by the Universidad de las Ciencias Informáticas (UCI). This tool analyzes the most important variables of web positioning (search engine optimization, network traffic optimization, usability and social networks, and web analysis), which influence the visibility of the Internet content of the analyzed websites. It analyzes nineteen evaluation criteria and indicates the number of problems it finds in each of these criteria. This serves to classify the webs in "High visibility" when 0 to 3 problems are detected in total among all the criteria; "Enough visibility", from 4 to 6; "low visibility", from 7 to 9, and "Insufficient visibility", when they are more than 10. To analyze the data, a descriptive statistical analysis of frequency counts was carried out, which has been translated into terms of percentages, having also categorized relevant qualitative
	Fair visibility	4 to 6 problems	
	Low visibility	7 to 9 problems	
	Insufficient visibility	More than 10 problems	

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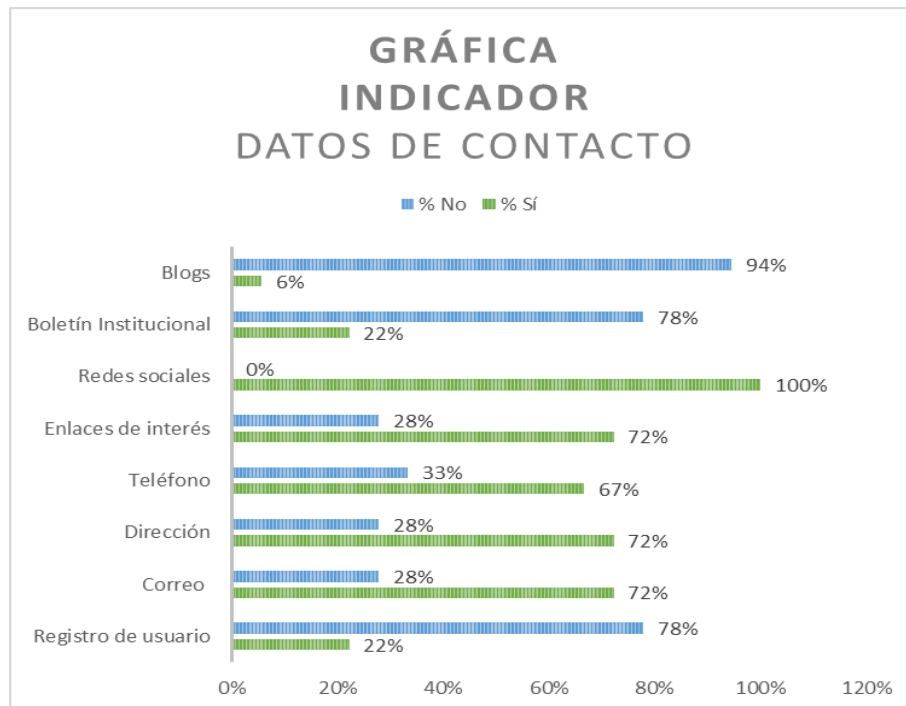|			information during the study of some of the variables.

Source: Self-made

4. DISCUSSION

After applying the proposed methodology and obtaining the results, the percentages of each variable were graphed for their qualitative understanding. It is necessary to note that, of the 20 universities selected in the sample, during the analysis period (November 2020), two websites corresponding to the Universidad de Ciencias Pedagógicas "Enrique José Varona" (UCPEJV) and the Universidad de Ciencias de la Cultura Física y el Deporte "Manuel Fajardo" (UCCFD) had ERROR 404[3] to access their URL, so it was not possible to analyze them. In such a way that the sample to be analyzed, in some of the dimensions, varies between 18 and 17 Cuban universities.

4.1. Dimension: Content.

4.1.1. Indicator: Contact information

For the analysis of the Content dimension with the indicator "Contact information", it was broken down into several definitions (User registration, email, institution address, telephone, link of interest, social networks, institutional newsletter, and blogs). During the analysis period, in general, all the studied universities have a high percentage in their definitions with the value of "yes" (Graph 1). This value means that the corresponding content is perceptible and the location of the data is visible while browsing the website.

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[3] The site might be temporarily unavailable or too busy.

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GRÁFICA INDICADOR DATOS DE CONTACTO

Graph 1: Analysis of the Content dimension, in the indicator "Contact information"
Source: Self-made

However, definitions such as "blog", "user registration", and "institutional newsletter" are the ones with the highest percentage of "no". A notorious fact is that all universities have a presence in social networks and, for the most part, they have more than two social networks, the main ones being Facebook and Twitter. These being the ones that appear with the most links on the website of some universities.

Nowadays the most important thing in a website is the contact information, it is the only way to bring the web consumers closer to the institution. During the study, it was observed that many present the institutional email, the physical address of the institution, as well as telephone numbers. But this contact information, besides being very important, need a person to be behind each channel, such as the email or the telephone to give an immediate response. In this, it must be taken into account that this person will not always have all the answers.

So, communication channels, such as the blog and the institutional newsletter, may currently be outdated for advances and communication terminologies on the internet, but not for a university institution. These enable it to inform, guide, plan, debate, and be in constant connection with the university-society binomial. The main purpose of communication channels of this type is to disseminate academic work on topics related to research, university culture, sports, teaching, study subjects, projects. Furthermore, they offer the possibility of presenting works carried out by professors and students, showing the news of the graduates, as well as exposing the lines of research and the study objectives. That is why they are not communication channels that should be put

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aside, especially because of the benefits and advantages they have to make the work of the institutions visible.

4.1.2. Indicator: Images on the web.

For this indicator (Graph 2) the same procedure was carried out, except that the observation method was the most used. It was found that several websites had defined a space for the image gallery and, in the vast majority, the images accompanied the text.

It is relevant to note that most of the images shown are from the institution and the majority of these are concentrated on the home page of all university websites. The highest percentage falls on the value of "yes", being the percentages with a result of "no" obtained less frequently. The university that has 6% of "no" is the Universidad de Santi Spíritus "José Martí Pérez".
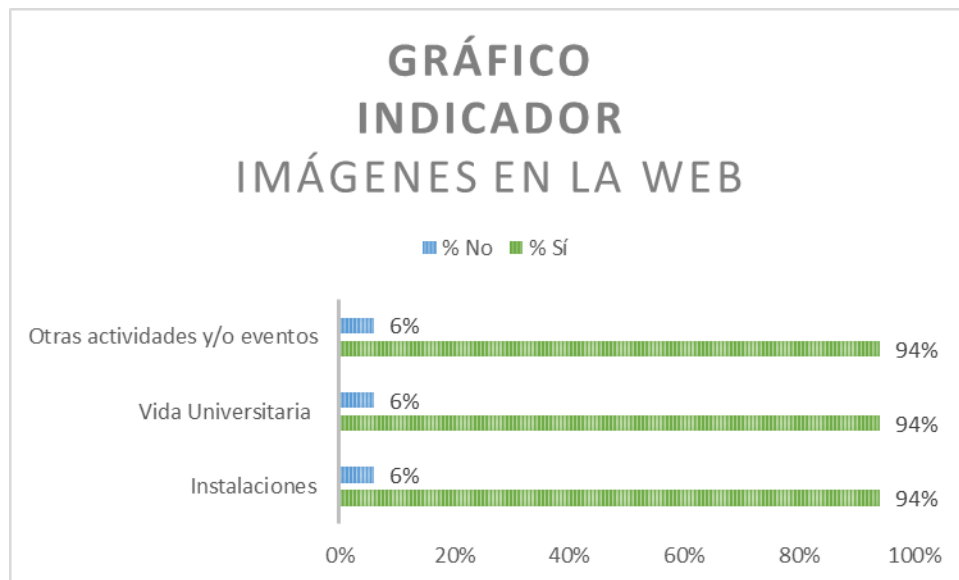
Graph 2: Analysis of the Content dimension, in the indicator "Images on the web"
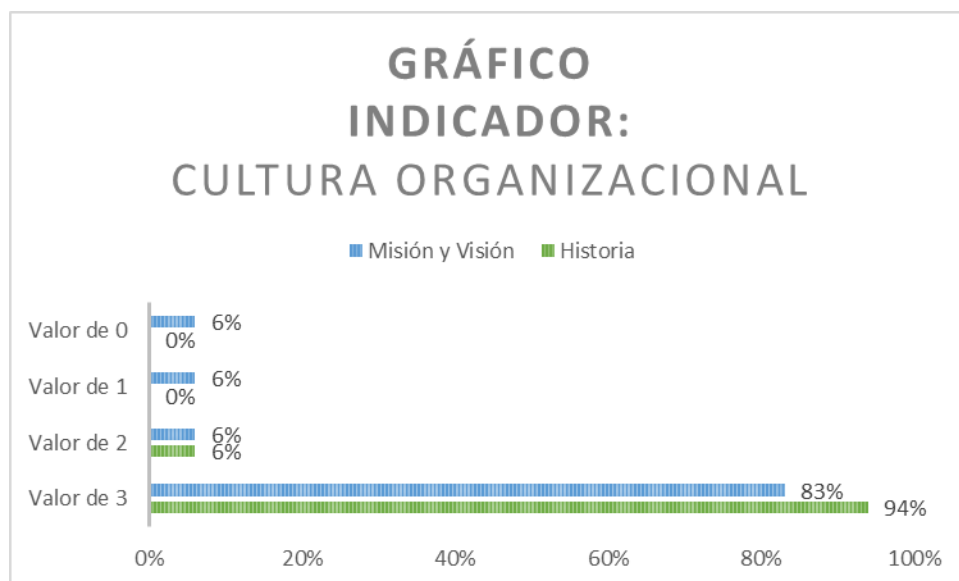**Source:** Self-made

It is pertinent to point out that even when most universities generate photographic content, they are not very careful with the format of the image because they show low quality and their location is mostly on the main page of the website. This can be a factor that detracts from the visuality and appreciation towards the website, so it can damage the users' interest to browse.

Photography, beyond marking an instant of some event, makes it possible to observe each portrayed object in detail. This is why, the image that is exposed in the institutions' websites must have good resolution, focus, and editing. The image has many interpretations from communication theory, but its essence lies in the ability it

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has to define and conceptualize a given person, institution, or space. This indicates that the first thing that should be clear in the visuality of the website of a university is that they are snapshots of the authorship of the institution itself and not from other sources, besides that this image transmits the moment that they want to tell, that it is clear and of good quality, because it can provide high prestige to the university at present and especially in the future, in which images are increasingly valuable.

4.1.3. Indicator: Organizational culture.

All Cuban university websites contain the History, Mission, and Vision section as a fundamental part of their web architecture. For this indicator (Graph 3), each definition was given a quantitative value, appreciable from 0 to 3 points. Most universities have part of this organizational culture incorporated into their website. The only different one is the Universidad de las Ciencias Informáticas (UCI), which obtained a value of 1 in the definition of "Mission and Vision" because only the Mission is visualized as an element of the organizational culture. This is also the case of the Universidad de Guantánamo (UG), which does not present the Mission or the Vision on its website, while the definition of History appears very briefly, for which it obtained a score of 2.

Graph 3: Analysis of the Content dimension, in the Indicator "Organizational culture"
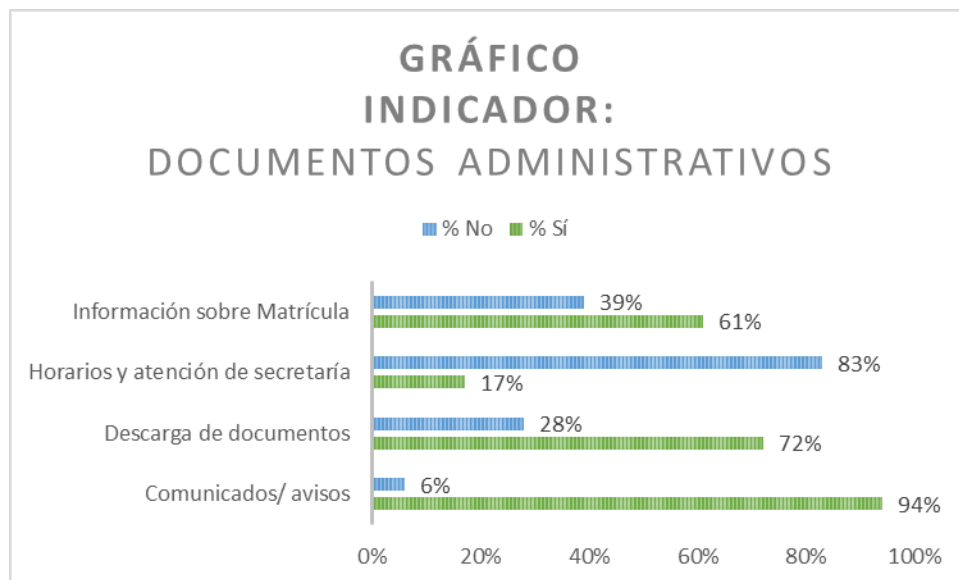**Source:** Self-made

In the obtained percentages, it is appreciated that there is specific importance on the exposure of the roots and emergence of the institutions, as well as the goals and aspirations they propose. This can be interpreted as a high value of identification, relevance, and visualization of telling their story, as well as who they are and their claims as a training and academic institution.

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It is good to emphasize that even when there are high percentages of the use of organizational culture —which is defined in this research as the history, mission, and vision of the institutions—, this is much more than that. It is defined as the beliefs, cultures, processes, principles, characteristics that build an institution and that are different in each one.

Universities have a common goal, but the organizational culture of each one of them differentiates them. For example, due to the influence of the territorial location itself, neither the people who make up a specific center nor the teaching of study subjects will be the same, although the latter are governed by national plans. Taking these differences into account, in this dimension only the presence of the organizational culture indicator is analyzed, but the true exposure of the information, its own structure, and whether they meet the standards of correct writing on history, mission, and vision of the institution on the website is not studied in-depth. This could lead to other research, due to the importance that the organizational culture of universities has.

4.1.4. Indicator: Administrative Documents.

In this section (Graph 4) it was checked that the contents of the university websites were understandable and offered information and guidance to all those who visited the site. In most cases, they are permanent information that does not vary, but it must be taken into account that new consumers, such as those interested in enrolling in undergraduate or postgraduate courses, arrive at them, at least annually.

GRÁFICO INDICADOR: DOCUMENTOS ADMINISTRATIVOS

■ % No ■ % Sí

	% No	% Sí
Información sobre Matrícula	39%	61%
Horarios y atención de secretaría	83%	17%
Descarga de documentos	28%	72%
Comunicados/ avisos	6%	94%

Graph 4: Analysis of the Content dimension, in the indicator "Administrative documents"
Source: Self-made

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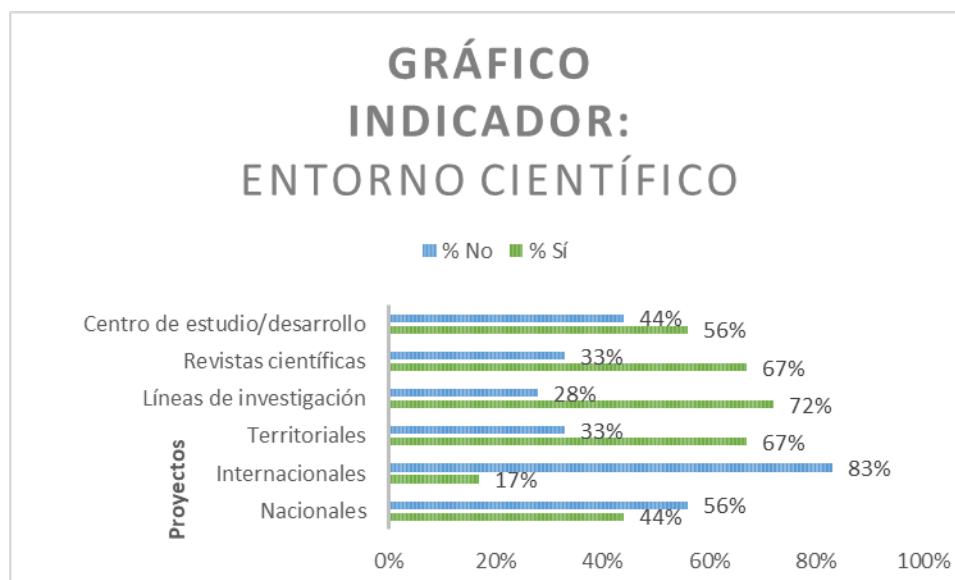
For this definition of "Enrollment Information", the highest percent of universities have their entry form published, especially the enrollment information for undergraduate courses. Something similar happens with the download of documents, this being an important point, which allows the user to access the downloaded information whenever they want without having to enter the website again. The percentage of "no" falls heavily on the definition of "Secretarial hours and attention", because it is not data that can be found on the website. And, finally, there is the definition of "Announcements/notices", in which the information about calls, events, news, among others, was collected and valued. This information is the most perceptible on all the analyzed websites. Almost everything corresponds to the "home page" section and some to the different undergraduate and postgraduate tabs.

This indicator is also one of the most important for direct communication with users because it is information from the institutional management itself. It is information that must be updated more frequently and that, therefore, is closer to the user. Through this indicator with its definitions, a good or bad evaluation of the users can be obtained, it all depends on the information that is managed and how it is exposed.

4.1.5. Indicator: Scientific environment.

This indicator (Graph 5) was revised several times, due to the observed information, but also due to its difficult interpretation, especially because of its variability in each of the analyzed URLs. An example of the above is the definition of projects, which due to their diversity of definitions in the websites of Cuban universities, were observed with project terminologies, through acronyms in Spanish such as Associated with National Programs (APN), Business Programs (PE), and Associated with Non-governmental Programs (APnG). This can be defined as a difficulty for interested parties, both national and international, who visit the site looking for related projects. Similarly, for this research, they were grouped as national, international, and territorial projects, to seek a standard definition and to be able to evaluate the indicator. However, in the websites, it is found that some do not have indicated the type of project. On the other hand, the definitions of "Research lines", "Scientific journals", and "Study/development center" have a high percentage of "yes" because the vast majority of the analyzed websites have very well defined and posted in those categories.

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GRÁFICO INDICADOR: ENTORNO CIENTÍFICO

■ % No ■ % Sí

- Centro de estudio/desarrollo: 44% / 56%
- Revistas científicas: 33% / 67%
- Líneas de investigación: 28% / 72%
- Territoriales: 33% / 67%
- Internacionales: 83% / 17%
- Nacionales: 56% / 44%

Graph 5: Analysis of the Content dimension, in the indicator "Scientific environment"
Source: Self-made

Even though most of the results are favorable, one cannot lose sight of the importance that the terminologies are very well defined, and that, because they are published on a web visible to the world, the communication codes must be standard for everyone —or at least for the community interested in the university. Taking into account the above, emphasis is placed on the correct definition of the projects and the category to which they belong, as this is one of the main pillars of higher education and having as a benefit the high attraction for external institutions. As the main conclusions in this indicator, very general information is observed, becoming a simple report to the recipient and not as information that can help future efforts by the interested party. Another important point is that it is not possible to know how up-to-date the published contents are because they do not present either start or expiration dates for some of the analyzed definitions, which are relevant information for any interested party depending on their interests.

4.1.6. Indicator: Teaching-Teacher.

Within this section (Graph 6) the highest percentages fall on "yes" for the definitions of "Undergraduate", "Postgraduate", and "Faculty", and within the definition of "Distance education" the highest percentage is "no" because many of the websites do not have published content corresponding to this definition, even though it should be clarified that not all universities have this service. It is good to point out that, even when the highest percentages of "yes" are implicit, its high percentage is due to having a presence and some other content on the web.

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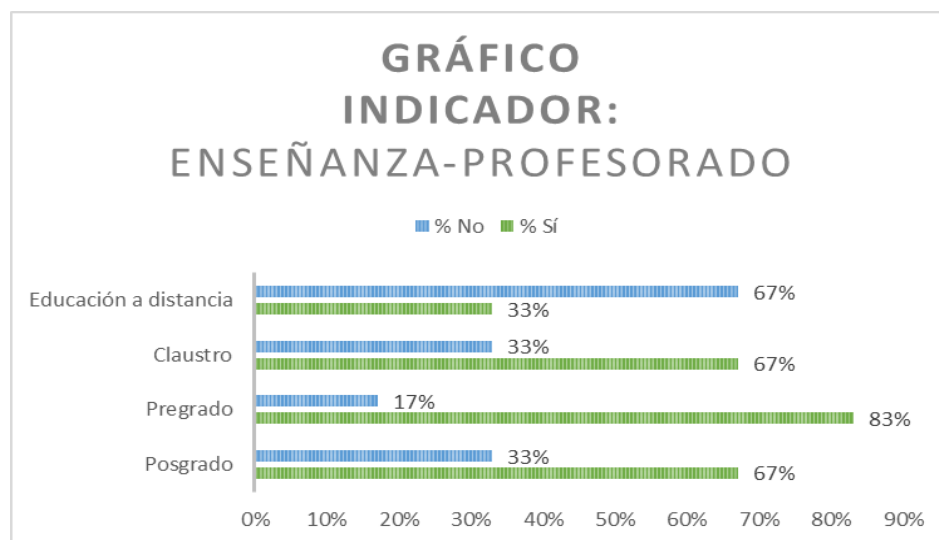
Graph 6: Analysis of the Content dimension, in the indicator "teaching-teachers"
Source: Self-made

If each of the definitions is observed in more detail, many URLs of universities only refer to "what is undergraduate" and "what is postgraduate" as general and informative content; as well as the mention of the faculty is made in the section of the "university in figures". With this, the information provided by each university is totally valid, but it may not be meeting the information needs of the interested parties. Without violating the privacy of the faculty data, nor the internal information on the undergraduate and postgraduate development, it is advisable to create a more detailed self-management or information system on access to the different teachings, as well as their link and functions to the faculty, as course coordinator[4], teacher guides, institutional emails, among others.

Creating a self-management system is to provide, within the websites, the possibility of being able to access enrollment, study topics, curriculum synthesis of teachers, and highlight their lines of research. It is to convert currently informative spaces into dynamic spaces for user participation. This indicator emphasizes the importance of making the information more dynamic because, even though the analyzes in this study were based on indicating the existence of definitions with the value of "yes" and "no", browsing through the links of these definitions is not satisfactory —in terms of the content of the information— because they present problems of little verification of the contents.
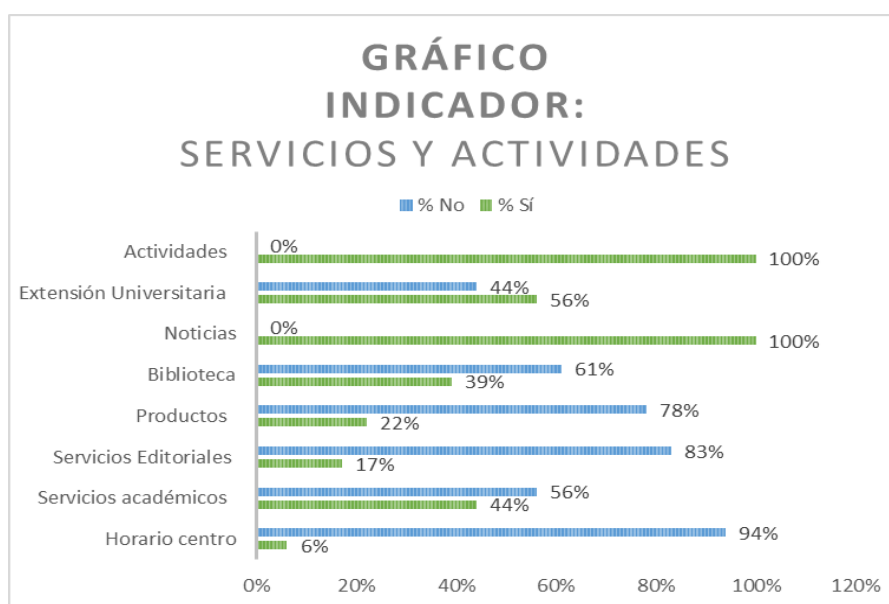
4.1.7. Indicator: Services and activities.

This indicator is the one that includes the most definitions (Graph 7), to evaluate the dynamics of the contents of the web, as well as the possibility of user interaction with

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[4] In the Cuban higher education system, the figure is named Main Professor of the Year and previously it was named Head of the Group of the Year.

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it. Of the eight definitions evaluated, five obtain the highest percentage of "no" because the information is little or simply the services or activities identified are not provided (Libraries, Products, Publishing services, Academic Services, and Center hours). These activities and services are considered a fundamental part of the architecture and management of a university website because they allow users to stay on the web for longer, as well as being able to find and, in turn, solve the needs of users.

The "yes" percentage falls on the definitions, as can be seen in Graph 7, "News" and "Activities", which have 100% presence in the university URLs in their entirety. In general, the websites in this indicator could take more advantage of the opportunities offered by the virtual environment and web development. Once again, the contents are very general, the content formats do not provide trust, the ignorance of the updating of the information can generate distrust in the user, and, consequently, bad reviews or simply no follow-up of the websites. This would bring, as a result, little visibility of the universities.

Graph 7: Analysis of the Content dimension, in the Indicator "Services and Activities"
Source: Self-made

Lastly, the percentages of the definition of "university extension" are referred to, classified in this section of "services and activities," due to the relevance and content it provides, as it is also one of the fundamental pillars of university development, according to the Reform of Higher Education in Cuba, which took place in 1962. But the breadth of the content generated by university extension is not reflected in the websites. It should be understood that 56% of the 18 universities analyzed mention the "university extension" with photographs of cultural and sports activities and some

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with community projects and chairs for the elderly, interpreting them as extracurricular activities.

44% with the value of "no" do not mention university extension activities on their websites. This does not mean that it can be classified as a low-quality website, only that it may be losing presence and space for user interactivity on the web.

4.2. Dimension: Appearance

Based on the observation, an assessment was prepared on the updating and appearance of the website. To do this, an analysis was carried out giving numerical values from 0 to 10, with a score of 10 being the highest value to be achieved. It is possible to affirm that the majority of the university URLs have a very low quality of presence and updating. The constant updating of the home page, in the news and activities section, is visible on many websites. Whereas, it is not as up-to-date in the other informational and management content, as evidenced in previous results.

The images and the web design are of low quality, especially the images, which are shown, on many occasions, pixelated. The slow loading of the web and the browsing within it is also evident. On the other hand, it should be noted that the website of the Universidad de Oriente (UO) has an optimal result in quality, image, management, and appearance, which was awarded the maximum rating of 10 points. This is followed by the website of the Universidad de las Ciencias Informáticas (UCI), with 9 points, and with 8 points are the Universidad Agraria de La Habana (UNAH) and the Universidad de La Habana (UH).

It is also necessary to point out that the assessment of the appearance dimension was analyzed during the entire browsing for the study of the websites, which allowed other indications to be provided. However, there are other methods to have more accurate results, such as evaluating the usability of websites. But, due to the deep browsing carried out for the present study and the applicability of the dimensions developed later, it was preferred to leave this dimension to the authors' assessment.

4.3. Dimension: Accessibility

For this dimension (Graph 8), each URL was analyzed on the Tawdis.net[5] website, according to the "Web Content Accessibility Guidelines (WCAG 2.0)" of the *Web Accessibility Initiative, the World Wide Web Consortium*. Of 20 Cuban universities, only 17 URLs could be analyzed in this dimension because in the analysis period (November 2020), the URL did not work correctly, neither for the analysis web, nor manually in the Google search bar, for the Universidad de Guantánamo (UG), the Universidad de Ciencias Pedagógicas "Enrique José Varona" (UCPEJV), and the Universidad de Ciencias de la Cultura Física y el Deporte "Manuel Fajardo" (UCCFD).

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[5] Web accessibility test http://www.tawdis.net

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For this reason, only 17 Cuban universities are counted, for which the results are unfavorable.
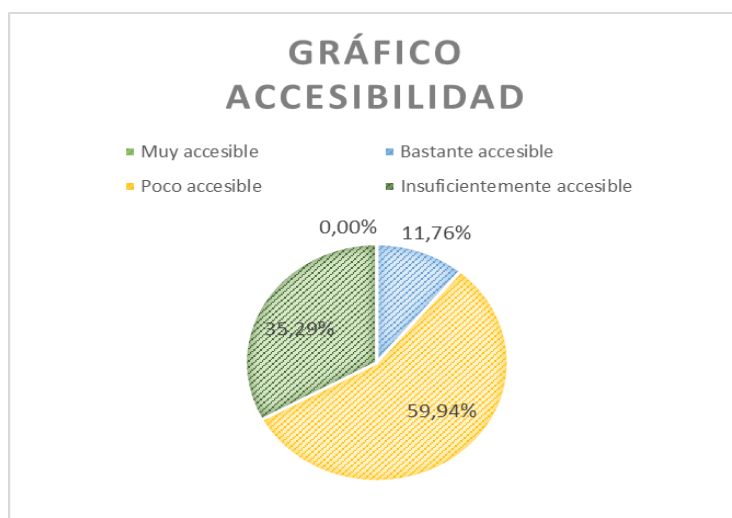
Graph 8: Analysis of the web accessibility of 17 Cuban universities
Source: Self-made

Of all the variables to classify accessibility, according to the number of problems identified by the analysis website, the highest percentage is found in the definition of "hardly accessible", with this definition having 10 Cuban universities for a 56%, while 5 Cuban universities are "Insufficiently accessible". As defined by the program where each of the available URLs for this dimension was analyzed, accessibility is interpreted as access to the information contained in the websites without any limitation due to deficiency, handicap, or used technology, without the interference of hearing, vision, or mobility problems, reading difficulties or cognitive comprehension, inability to use the keyboard or mouse, text-only reader, small screen, or slow connection. Accessibility improves access to the web in general and this is not only of interest to people with disabilities. It is then that it can be affirmed that the websites of Cuban universities are not accessible in general, that the information has limitations for its full access. Another point to review and generate improvements based on optimal development and use of these virtual spaces.

4.4. Dimension: Web SEO Positioning

For this dimension (Graph 9), the SEO WebMas[6] website was used, created and developed by the Universidad de las Ciencias Informáticas (UCI). It was added for web analysis because depending on the level of SEO positioning that a website has, this will be its level of visibility on the internet. As the term visibility is the starting

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[6] Web program to determine SEO positioning https://seowebmas.redcuba.cu/sitiosweb.

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point for this research, the dimension was defined with the following variables: "High visibility", "Fair visibility", "Low visibility", and "Insufficient visibility".

Now, the WEBSEO website helps to analyze each university URL, providing indicators of "correct", "to improve", and "incorrect" and obtaining quantitative results by indicators. The results were achieved on a descriptive statistical analysis of the frequency count, which has been translated into terms of percentages. In other words, to quantitatively define each definition of SEO positioning, which varies from high to insufficient visibility, a frequency of numbers was created according to the data provided by the "incorrect" indicator of the WEBSEO program, remaining as follows: "High visibility", from 0 to 3 problems; "Fair visibility", from 4 to 6 problems; "Low visibility", from 7 to 9 problems, and "Insufficient visibility", more than 10 problems, so that the more numbers with the value of "Incorrect", the analyzed URL has the value of "Insufficient visibility".

For the study of this dimension, it was not possible to take into account the 20 universities in the sample because on the date of analysis of the URLs, the addresses of the Universidad de Sancti Spíritus "José Martí Pérez" (UNISS) and the Universidad de Ciencias de la Cultura Física y el Deporte "Manuel Fajardo" (UCCFD) did not work and no data was found in the web analysis tool. Following the above, the total analyzed was 18 Cuban universities for 100%; while, the most critical results are in the variable of "low visibility", with 50% of Cuban universities, and 28% in the variable of "insufficient visibility".
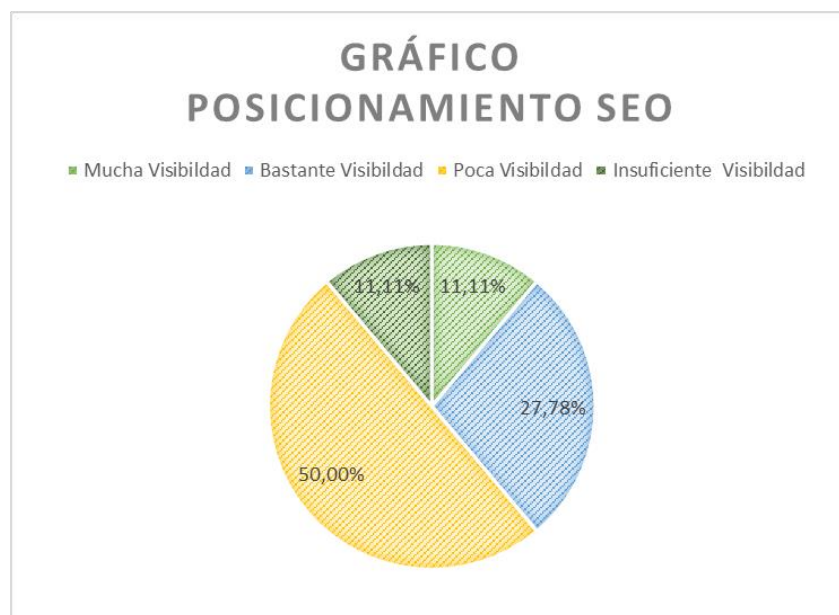
Graph 9: Analysis of the definition of the web SEO positioning of the URLs of 18 Cuban universities
Source: Self-made

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Once all the above is understood, the first insufficiency is that of the 20 Cuban universities, only 18 could be analyzed due to the non-functionality of the URL of the two aforementioned universities. On the other hand, the highest percentage falls on "low visibility", obtaining a frequency of problems between 7 and 9 incorrect indicators identified by the program. Those incorrect indicators can vary between web usability (WWW redirect and feed in meta), search engine optimization (title, description, keywords, conical URL, page encoding, Robots, Sitemap, HTML5, Language, and Error404), network traffic optimization (caching, resource compression, Minified HTML, Minified CSS, Minified JS), and Social networks and web analytics (Twitter card, Open Graph, and Web Analytics).

5. CONCLUSIONS

As a general summary, disappointing results were obtained from the websites of Cuban universities. Websites have few management possibilities for their external public and self-management possibilities for their internal public. Moreover, they mostly present totally generic content, these being purely informative. Some of those are up-to-date and some are not, and some consider the publication date and the status of the news itself. In the same way, during the browsing for the analysis, links were sometimes found that do not lead to any site, returning an error or simply presenting the warning page of a virus or an unsafe page, according to the "automatic virus detector" of the Chrome and Firefox browsers. This becomes a barrier for the user who wishes to continue browsing the web of interest because it does not provide security and trust.

The content indicator analysis was quite cumbersome. This is due to the manual work that was carried out to obtain the data, this being a quite operative method to understand the current state of communication of the university websites. The first thing this result made us understand is the importance of the web being more concrete in its information structures and that it complies with the information architecture and web design standards. Most universities have their contact information, some images of the institution, and university life, although many websites do not define the moments of the images or do not have the "image gallery" section. Administrative documents are not shared on the web, understood as regulations, institutional policies, notices, communications, among others. Regarding the visualization of the professors, in some websites, only the structure of the board of directors is shown, and in others the faculty by career, as well as the different university majors as part of the university institutional structure.

One thing to note is that there is no content or study marketing. There are no study offers, course announcements, or even the promotion of the institution itself, which can be seen as an attraction for potential professionals. Other very favorable aspects lie in the news and events section. All websites have their news section updated, as well as their events to be held or already held. Something to improve would be that the creation of these runs by the institution because many were taken from outside

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sources, especially the press. This means that there is no proper update on the work of the university center. On the other hand, much information is lacking on the services of the institutions, such as the university agenda (calendar and class schedules, access to the library, question and answer services, among others).

Regarding the accessibility dimension, the highest percentage of the websites of Cuban universities is in the definition of "hardly accessible", due to the large number of problems detected by the analysis tool. According to the observation of each of the reports obtained in the analysis website, some of the problems repeated in all the URLs of the Cuban university websites were due to "Non-textual content", "Information and relationships", "Purpose of the links (in context)", "Processing Labels or instructions", among others. It should be noted that the most noted problem in all the websites analyzed is that of "non-textual content". According to the TAW analysis tool itself in the section Understanding Success Criterion 1.1.1 | Understanding WCAG 2.0 (2016) defines this problem as: "Non-text Content: All non-text content that is presented to the user has a text alternative that has the equivalent purpose, except in the situations listed below. (Level A): Controls, input, time-based media, test, CAPTCHA and Decoration, format, invisible" (W3C, 2016).

Along the same lines, in the Web SEO positioning dimension, the indicators defined as incorrect that oscillate the most for the WEBSEO program, once the URLs of Cuban universities have been analyzed, are in search engine optimization, in the title section because many times university titles do not correspond to the maximum number of appropriate characters, for this it is recommended to have a unique title that is descriptive and contains the most important keywords, and also because search engines have little space on their pages to display the titles, it is recommended to have a title of adequate size so that it appears complete. Another indicator repeated as incorrect in the analysis was about the optimization of network traffic due to caching, indicating that the website has not defined that the cover page is cached in browsers, which increases the cost of bandwidth and hosting, therefore, the response time is slow. Lastly, another widely repeated incorrect indicator was the usability in terms of WWW performance, in which many pages did not have the correct address configured to send the traffic of the versions with and without www. towards the main domain. These are some of the problems defined as incorrect that were found in the analysis of the WEBSEO. They also constitute incorrect indicators for the present research because they give little visibility to the websites and they should not be lost sight of, because they are simple details that can generate complaints in users.

In these times when the web is used intensively, mainly due to the COVID-19 pandemic, if a virtual space is not created adjusted to user demand, the main consequence will be its null visibility and, consequently, a very low reputation. This assertion, in the case of this study, is closely related to the difficulties that were detected in analyzing 100% of the sample in each dimension. It was not possible to reach the 20 proposed universities in the dimensions, due to the 404 error of the websites of some universities. The total sample in dimensions ranged from 17 to 18

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universities and errors were always repeated on the websites of the Universidad de Ciencias Pedagógicas "Enrique José Varona" (UCPEJV) and the Universidad de Ciencias de la Cultura Física y el Deporte "Manuel Fajardo" (UCCFD), who are the top leaders in their fields of study.

Without a doubt, Cuban universities have achieved a virtual space that makes them visible to Cuba and the world. This becomes, now more than ever, a new/another letter of introduction of who they are and what are their lines of study and extracurricular work. Websites give it visibility in the virtual environment but these spaces must adapt to new trends, which undoubtedly becomes one of the great challenges that, together with teaching through virtual learning environments, the universities in Cuba have today. The goal is to have websites that offer a 360-degree view of everything that happens in universities and that, at the same time, also enable self-management of content by not only the faculty and students but also the users who visit them.

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