Evaluating the content strategy developed by universities on social media

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Abstract

Institutional communication is becoming a strategic instrument for universities, since it facilitates the relationships with their various publics and allows positioning of the institutional brand, which will contribute to building a distinctive reputation. The types of content disseminated by universities via their social media accounts will contribute decisively to these objectives, since the way in which the different topics are communicated may influence the publics' perceptions of these higher education institutions. This research analyses the different types of content disseminated by universities (in Europe, the United States and Latin America) via their accounts on social networks (*Twitter*, *Facebook*, and *LinkedIn*), to assess the main content topics that define the universities' communicative positioning. A content analysis of the publications by universities on their social networks was carried out, representing an appropriate method to recognize the main themes and topics of their communication strategy. The results reveal two main thematic blocks of content: functional (teaching, research and social commitment topics) and institutional (organizational and contextual topics). Institutional publications are the most relevant block of content, far above the functional posts. In terms of specific topics, the organizational ones are the most common, well above publications on teaching or research, while contextual and social commitment content is used marginally. Most universities, in all regions and on all social networks, follow a dominant strategy of institutional content. So, the higher education institutions are mainly using social networks as a strategic tool for institutional positioning, more than informing about their daily activity.

Keywords

Universities; Higher education; Institutional communication; Corporate communication; Public relations; Digital communication; Internet; Social networks; Social media; Content strategy; Institutional content; Functional content; *Twitter*; *Facebook*; *LinkedIn*.

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1. Introduction

University institutions contribute to the economic development of their environment and generate significant social value (**Kimmons**; **Veletsianos**; **Woodward**, 2017; **Kisiolek**; **Karyy**; **Halkiv**, 2020; **Melewar** *et al*., 2018). The important role of universities is manifested by way of three main functions.

- The first is *teaching*, focusing on training people, which will be highly valuable for the whole community (**Kisiolek**; **Karyy**; **Halkiv**, 2020; **Marino**; **Lo-Presti**, 2018; **Plungpongpan**; **Tiangsoongnern**; **Speece**, 2016).
- Their second function is *research*, acting as an engine to generate scientific knowledge, which contributes to cultural, social, and economic development (**Simancas-González**; **García-López**, 2017; **Plungpongpan**; **Tiangsoongnern**; **Speece**, 2016; **Kisiolek**; **Karyy**; **Halkiv**, 2020; **Marino**; **Lo-Presti**, 2018).
- A third area of responsibility corresponds to the so-called Third Mission, related to their *social commitment*, seeking to provide solutions to social problems and needs (**Sutton**; **McEachern**; **Kane**, 2018; **Marino**; **Lo-Presti**, 2018; **Carpenter** *et al*., 2016; **Gori** *et al*., 2020).

In the current competitive context, universities need to communicate their academic, research and social commitment performance proactively, but also inform about the management of the institution itself and give their opinion concerning the important issues in their environment. Institutional communication thus becomes a strategic instrument that enables enhanced functioning of the institution and a better integration with and understanding by society. By selecting their most relevant content and combining different topics, universities generate a concrete communicative positioning that contributes to achieving their general objectives.

2. Theoretical framework

2.1. Universities' digital institutional communication

Institutional communication has become an essential tool to promote the mission of the university, develop its functions and achieve its objectives as an institution (**Chapleo**; **Carrillo-Durán**; **Castillo-Díaz**, 2011; **Davies**, 2020; **Brzakovic**; **Brzakovic**; **Brzakovic**, 2019; **Gordon-Isasi**; **Narvaiza**; **Gibaja**, 2021).

Such communication is a fundamental instrument of the university to dialogue with all its publics. On the one hand, it facilitates exchange and relationships with internal publics (**Melewar** *et al*., 2018; **Overton-de-Klerk**; **Sienaert**, 2016; **Simancas-González**; **García-López**, 2017; **Eger** *et al*., 2020; **Uslu**, 2018). On the other, it allows establishing an important interaction with the university's external publics, such as the different members of the social, cultural, political, and economic environment (**Marino**; **Lo-Presti**, 2018; **Edmiston-Strasser**, 2009; **Yusof** *et al*., 2018).

All of this allows promoting and positioning the institutional brand of the university, which will contribute to building and developing a solid, distinctive and differential reputation (**Foroudi** *et al*., 2017; **Sataoen**; **Wæraas**, 2016; **Rutter**; **Lettice**; **Nadeau**, 2017; **Edmiston-Strasser**, 2009; **Plungpongpan**; **Tiangsoongnern**; **Speece**, 2016; **Chapleo**; **Carrillo-Durán**; **Castillo-Díaz**, 2011; **Melewar** *et al.*, 2018; **Grover**; **Kar**; **Ilavarasan**, 2019; **Simancas-González**; **García-López**, 2017; **Lee**; **Merle**, 2018; **Fähnrich**; **Vogelgesang**; **Scharkow**, 2020).

In an increasingly competitive higher education market, more and more universities are adopting institutional communication via the internet to design their communication strategies (**Lažetić**, 2019; **Xie**; **Teo**, 2020; **Peruta**; **Shields**, 2016), which makes it possible to more solidly and permanently dialogue with their publics (**Marino**; **Lo-Presti**, 2018; **Royo-Vela**; **Hünermund**, 2016; **Albanna**; **Alalwan**; **Al-Emran**, 2022), creating a fluid conversation (**Atarama-Rojas**; **Vega-Foelsche**, 2020; **Eger** *et al.*, 2020) and enhancing relationship-building (**Gori** *et al*., 2020; **Kimmons**; **Veletsianos**; **Woodward**, 2017).

A significant amount of international research in recent years has focused on highlighting the importance of universities' digital institutional communication at all levels (**Ebrahim**; **Seo**, 2019; **Gori** *et al.*, 2020; **Kisiolek**; **Karyy**; **Halkiv**, 2020; **Martínez-Cardama**; **Pacios**, 2020; **Brech** *et al*., 2017; **Xie**; **Teo**, 2020). It serves to give greater visibility to their institutional discourse (**Marino**; **Lo-Presti**, 2018), helping to meet the public's needs for information (**Kimmons**; **Veletsianos**; **Woodward**, 2017) and enabling institutions to become a source of information for all those with an interest in university matters (**Fähnrich**; **Vogelgesang**; **Scharkow**, 2020; **Kisiolek**; **Karyy**; **Halkiv**, 2020).

Likewise, **Oliveira**, **Capriotti** and **Zeler** (2022) carried out an extensive bibliometric review on scientific research on digital communication in universities in the last 30 years and pointed out that studies on the use of social networks in these institutions have grown in the last decade, demonstrating the importance it has acquired for academics and communi-

cation professionals. Various studies coincide in pointing out that there has been growth in the use of social networks by universities for more than a decade, but that their effectiveness remains at very low levels, not taking advantage of all the possibilities of social media. According to **Simancas-González** and **García-López** (2022), the use of social networks by universities is one of the issues that has aroused the most attention in recent years, especially on *Facebook* and *Twitter*. There is also a growing use of *Instagram* (**Alcolea-Parra**; **Rodríguez-Barba**; **Núñez-Fernández**, 2020), *LinkedIn* (**Cestino-González**, 2020) and *YouTube* (**Simancas-González**; **Blanco-Sánchez**, 2022). However, the use of social networks by universities is not homogeneous (**Simancas-González**; **Blanco-Sánchez**, 2022), since a few entities (the most prestigious in research or teaching) tend to publish a greater number of contents that tries to inspire and motivate their users, while a large majority of institutions focus mainly on content with a more unidirectional approach and institutional self-promotion (**Simón-Onieva**, 2017; **Segura-Mariño**; **Paniagua-Rojano**; **Fernández-Sande**, 2020).

2.2. Key contents of university communication

The Internet, in general, and the social networks, particularly, are suitable channels for universities to disseminate their different contents among their stakeholders (**Atarama-Rojas**; **Vega-Foelsche**, 2020; **Fähnrich**; **Vogelgesang**; **Scharkow**, 2020; **Peruta**; **Shields**, 2016). Some authors (**Marino**; **Lo-Presti**, 2018; **Peruta**; **Shields**, 2016; **Bélanger**; **Bali**; **Longden**, 2014) highlight that the content disseminated by universities will contribute decisively to their positioning and reputation, since the way in which the content is communicated through the Internet may influence the publics' perceptions of these higher education institutions.

In a bibliometric review of three decades of studies about the institutional communication of universities, **Zeler**, **Capriotti** and **Oliveira** (2023) point out that the topics disseminated by higher education institutions have been a key aspect of the research done about their institutional communication. Other specific studies also found similar results (**Atarama-Rojas**; **Vega-Foelsche**, 2020; **Oliveira**, 2020; **Simancas-González**; **Blanco-Sánchez**, 2022; **Simancas-González**; **García-López**, 2022). Five main thematic roles of universities can be acknowledged: teaching, research, social commitment, organizational, and regarding their context. The dissemination of information concerning each of them will help strengthen a certain profile and establish a communicative positioning of each of the university institutions.

Teaching content

Related to academic life, training programmes and teaching activity (which will enhance *academic positioning*), it includes information on undergraduate and postgraduate activity, teacher and student mobility, internationalization, etc. (**Di-Nauta** *et al*., 2020; **Ebrahim**; **Seo**, 2019; **Fähnrich**; **Vogelgesang**; **Scharkow**, 2020).

Research content

Related to the projects and research activity of the university, as well as the research outcomes (which will boost its *research positioning*). This encompasses content on R&D& I projects, doctorates and publications resulting from research (**Alonso-Flores** *et al*., 2020; **Atarama-Rojas**; **Vega-Foelsche**, 2020; **Fähnrich**; **Vogelgesang**; **Scharkow**, 2020).

Social commitment content

Focusing on the "third mission" of the institution: its social integration, links, and commitment, as well as its USR and sustainability projects and activities (which will promote its *social positioning*) (**Di-Nauta** *et al*., 2020; **Gori** *et al*., 2020; **Marino**; **Lo-Presti**, 2018).

Organizational content

Informing and promoting its operation and general activity, as well as the daily performance of its managers, to render the administration of the university transparent to its multiple publics (which will boost its *organizational positioning*) (**Atarama-Rojas**; **Vega-Foelsche**, 2020; **Ebrahim**; **Seo**, 2019; **Fähnrich**; **Vogelgesang**; **Scharkow**, 2020).

Contextual content

The dissemination of topics or events of the general environment (social, economic, cultural, etc.) and, in some cases, disseminating an opinion or adopting a stance on them (which can establish their *environmental positioning*) (**Atarama-Rojas**; **Vega-Foelsche**, 2020; **Ebrahim**; **Seo**, 2019).

From this five specific contents linked to university activity, two main general blocks of information can be recognized: *Functional* and *Institutional*.

Functional

An initial, general block of content, of an essential or basic nature, which we can call "*Functional*" (**Fähnrich**; **Vogelgesang**; **Scharkow**, 2020; **Alonso-Flores** *et al*., 2020; **Overton-de-Klerk**; **Sienaert**, 2016; **Vogler**; **Schäfer**, 2020; **Carpenter** *et al*., 2016; **Schwetje** *et al*., 2020), focuses on all information on the development of activities related to the three main roles or functions of universities: their teaching activity, research activity, and social actions.

Institutional

The second general block of content, which complements the previous one, which we will call "*Institutional*", focuses on the dissemination of content on the running and management and the governance of the university itself (organizational

content) and on the opinion or position of the entity regarding the key aspects and events related to the environment (contextual content) (**Atarama-Rojas**; **Vega-Foelsche**, 2020; **Simancas-González**; **García-López**, 2017; **Marino**; **Lo-Presti**, 2018; **Ebrahim**; **Seo**, 2019).

3. Scope of research

The main objective of this research is to acknowledge and analyse the different types of content disseminated by a set of benchmark international universities (in Europe, the United States and Latin America) on their main social networks (*Twitter*, *Facebook*, and *LinkedIn*), which allows identifying and evaluating the general lines of content that define the universities' communicative positioning.

4. Methodology

The universities were chosen based on two criteria: geographical area of location and presence and position in the main international rankings. On the one hand, the research focuses on the following areas: Europe, as it is a clear benchmark for higher education at international level; the United States, as an area in itself, due to the large number of universities present in the rankings and the preponderant place enjoyed in many of them; and Latin America, for its high potential and level of university development. Also, the position occupied in the 2020 edition of the three most prestigious international rankings (the most up-to-date at the time of performing sample selection) was taken as a reference:

- *Academic Ranking of World Universities*, (*ARWU*).
- *Times Higher Education Ranking* (*THE*).
- *QS World University Ranking*.

For the European and US universities, their position among the top 100 entities in the rankings was taken into account. In the case of Latin American universities, as they are not found among the top 100 in any of the rankings, they were chosen on the basis of their global position. A total of 70 universities were chosen: 20 from the United States, 25 from Europe, and 25 from Latin America (Table 1). Among European and Latin American universities, priority was given to geographical diversity, selecting 25 entities (instead of 20 as in the US, with a more unified sector), in order to achieve greater representativeness of universities from different countries.

Table 1. Universities studied

Europe	United States	Latin America
University of Oxford	*Harvard University*	*Universidad de Buenos Aires*
University of Cambridge	*Stanford University*	*Universidad Nacional de Córdoba*
University College London	*Massachusetts Institute of Technology* (*MIT*)	*Universidad Nacional de La Plata*
Imperial College London	*Princeton University*	*Universidad Austral*
University of Edinburgh	*Columbia University*	*Universidade de São Paulo*
University of Manchester	*California Institute of Technology* (*Caltech*)	*Universidade de Campinas*
King's College London	*University of Chicago*	*Universidade Federal de Rio de Janeiro*
University of Bristol	*Yale University*	*Universidade Federal de Minas Gerais*
London School of Economics and Political Science	*Johns Hopkins University*	*Universidade Católica de Rio de Janeiro*
University of Warwick	*University of Pennsylvania*	*Universidade Católica de Rio Grande do Sul*
Sorbonne Université	*University of Michigan - Ann Arbor*	*Universidad de Chile*
Paris Sciences et Lettres (PSL)	*University of North Carolina - Chapel Hill*	*Pontificia Universidad Católica de Chile*
Paris Saclay	*University of California - Berkeley*	*Universidad de Concepción*
Heidelberg University	*University of Washington - Seattle*	*Universidad de Santiago de Chile*
University of Munich (LMU)	*Purdue University - West Lafayette*	*Universidad Nacional de Colombia*
Technical University of Munich	*University of Illinois - Urbana Champaign*	*Universidad de Antioquia*
Swiss Federal Institute of Technology Zurich	*University of Texas - Austin*	*Pontificia Universidad Javeriana*
University of Zurich	*University of Wisconsin - Madison*	*Universidad de Los Andes (Colombia)*
Swiss Federal Institute of Technology Lausanne	*University of Maryland - College Park*	*Universidad Nacional Autónoma de México*
Utrech University	*University of Minnesota - Twin Cities*	*Universidad Autónoma Metropolitana*
University of Amsterdam		*Benemérita Universidad Autónoma de Puebla*
Karolinska Institute		*Tecnológico de Monterrey*
University of Oslo		*Universidad Nacional Mayor de San Marcos*
University of Helsinki		*Universidad San Francisco de Quito*
University of Copenhagen		*Universidad de la República*

For the selection of the social networks for analysis, their relevance for universities' digital institutional communication was considered.

- *Facebook*, as it is the social platform with the highest number of active users monthly worldwide; and it allows institutions to share content about their values and activities (**Capriotti**; **Zeler**; **Oliveira**, 2019), which favors universities to develop their own stories and interact with their community (**Eger** *et al.*, 2020).
- *Twitter*, due to its important role in disseminating information; characterized by people re-tweeting other's content on current issues in real time (**Capriotti**; **Ruesja**, 2018), which fosters greater interaction of higher education institutions with their environment (**Kimmons**; **Veletsianos**; **Woodward**, 2017).
- *LinkedIn*, as it is a reference platform for professional and work-related activity, for which it promotes and contributes to the employability discourse that is a key aspect of university purpose (**Komljenovic**, 2019).

The official institutional (corporate) accounts of the chosen universities on the three selected social networks were analyzed. Universities have many profiles on social networks, but the institutional corporate account is the one that all higher education institutions have available, which allows for a more appropriate comparative analysis between universities, regions and networks. To identify the different official profiles of each university on social networks, we resorted to the universities' own websites, the most popular Internet search engines, and also the search engines of each social network.

The defined unit of analysis consists of the publications, both proprietary and shared, by the selected universities on their official institutional *Facebook*, *Twitter*, and *LinkedIn* accounts. All publications made during a six-month period of 2021 were recorded: Three months in the first semester, from 15 March to 14 June (13 weeks, 91 days), and three months in the second semester, from 15 September to 14 December (13 weeks, 92 days). In total, 26 weeks and 183 days. A broad period was established to obtain a significant volume of information for analysis and to avoid possible biases produced by specific situations or actions, as could be the start of the university academic year, a special event, or a specific crisis. All publications were selected rather than a sample selection of publications, in order to obtain complete, reliable data on the volume and intensity of the universities' communication activity. The 70 universities analysed disseminated 99,954 publications through their profiles on social networks.

To achieve our general objective, the following research questions (RQ) were raised:

RQ1. What types of content have the universities posted on their social networks?

RQ2. Are any significant differences found between regions?

RQ3. Are there significant differences between platforms?

RQ4. Can groups of universities with similar approaches or lines of communication be recognized in relation to their content?

To work on the research questions, a content analysis of the publications of the universities on their social networks was carried out, since it represents an appropriate method to reliably recognize the visible communication strategy of their contents.

For RQ1, the "content" category of analysis was defined. It will allow recognizing and analysing the relevant topics dealt with by the universities on their social networks (**Capriotti**; **Zeler**; **Oliveira**, 2019; **Capriotti**; **Ruesja**, 2018; **Capriotti**; **Losada-Díaz**, 2018). To this end, five main themes were identified:

- *Teaching*: information relating to training activity and the teaching-learning process, both undergraduate and postgraduate, as well as teaching activities, methodologies, academic outcomes, evaluations of faculty, awards, teaching publications, etc.
- *Research*: information related to the research activity of the university (R&D&I projects, doctorates, research, scientific publications, etc.).
- *Social commitment*: information related to the university's sustainable action, as well as its social activity and its link with the community.
- *Organizational*: information on the general running and governance of the university (positions, roles, structure, appointments, etc.).
- *Contextual*: information on general issues (social, economic, cultural, etc.) of the environment. Each of the publications analysed could be categorized into a maximum of two topics.

From these five types of content, two large blocks of information were defined:

- the first three (teaching, research, and social commitment) make up the "*Functional*" block (referring to the three essential functions of the institution);
- while the last two (organizational and contextual) constitute the "*Institutional*" block (related to the general management of the entity).

For RQ2, in order to determine whether there are significant differences between the regions to which the universities analysed belong, a one-factor Anova analysis was performed. The comparison of the mean publications of the types of content analysed allows seeing whether there are differences between the regions of the universities analysed (Europe, United States and Latin America) and if these differences are significant.

For RQ3, a one-factor Anova analysis was applied in which the means of the content topics were compared with respect to the social networks used (*Twitter*, *Facebook*, and *LinkedIn*), to identify whether there are significant differences between the groups analysed and determine whether the use of one social network or another generates differences with respect to the type of content published.

For RQ4, a cluster analysis was applied, which allows identifying groupings of subjects from the values observed in the total of a set, with the aim of recognizing whether there are groups of universities that could have similar communication approaches or lines in relation to the contents. First, a two-step cluster analysis was carried out using the log likelihood measure and Bayesian information criterion to determine the number of clusters to be extracted. The K-Means method was then used to extract the clusters based on content type. Subsequently, a simple correspondence analysis was performed to be able to observe the existing distances between the conglomerates and the different regions to which the universities belong.

The collection and processing of information was carried out by an external company, *Noticias Perú*, via its platform and mass data and information collection and management system:
https://www.noticiasperu.pe

To this end, two work teams in that company were set up:

- one team of three people (one supervisor and two technicians) for the search and retrieval of publications, and
- another team of three people (one supervisor and two analysts) for the initial data extraction and analysis.

The period to collect and process the posts was from 15 March to 30 June and from 15 September to 30 December 2021.

Intercoder reliability and agreement allow evaluating the degree of consistency in the implementation of an analysis system. To evaluate the reliability of the method used, the two analysts carried out a test on a sample of 300 publications using a random procedure. This sample is highly satisfactory for properly evaluating concordance and reliability between two analysts (**Lombard**; **Snyder-Duch**; **Bracken**, 2002). Based on 2×2 contingency tables as a basis for statistical analysis and with a 95% confidence interval, the percentage calculation of agreement between the two analysts is established, to ascertain whether the observations by both obtain similar results. Cohen's kappa coefficient (k) is also calculated to assess the reliability of the categorical variables (**McHugh**, 2012).

To interpret the results of Cohen's kappa coefficient, the measurement ranges proposed by **Landis** and **Koch** (1977) are applied:

- 0.01-0.20 slight agreement;
- 0.21-0.40 fair agreement;
- 0.41-0.60 moderate agreement;
- 0.61-0.80 substantial agreement;
- 0.81-1.00 near perfect or perfect agreement.

For the interpretation of the results of the level of agreement, the equivalent percentages are applied. The following percentage of agreement was obtained: 91% for Topic 1 (Kappa value .83) and 90% for Topic 2 (Kappa value .80), demonstrating high agreement in the criteria of the tool, and so it can be concluded that the measurement is adequate.

The data were recorded in an Excel template and subsequently analysed using *IBM SPSS Statistics 25* software for statistical processing and to obtain the results by the research team.

5. Results

5.1. Types of content

Regarding the general types of information (Table 2), the "functional" block, which includes the thematic contents of *teaching*, *research* and *social commitment*, accounts for 30.5% of all publications. The "institutional" block, with contents related to *organizational* and *contextual* issues, accounts for 69.5%. The greater proportional weight of general publications of an institutional scope is also observed by region: in the United States they amount to 77.4%, in Europe they are at the general average (70.6%), and in Latin America they represent 64.8%.

In relation to specific thematic contents, *organizational* ones are those most produced (66.4%), followed by *teaching* (19.9%) and *research* (7.6%) and to a lesser proportion those concerning the university *context* (3.2%) and *social commitment* (3.0%).

Taking the analysis by social networks (Table 3), *Twitter* is the social network most used by all the universities analysed to disseminate their publications (58.2%; n=58,156), followed by *Facebook* (31.3%; n=31,070), and *LinkedIn* (10.7%; n=10,728). By social network and type of content published, a priori there are no major differences in their distribution by blocks, and a balanced distribution is observed between them, except on *Facebook*, which has a greater proportional weight of the "functional" field.

Table 2. Marginal distribution of the number of publications by types of thematic content, block, and region

Blocks	Topics	Region							
		Europe		USA		Latin America		Total	
		n	%	n	%	n	%	n	%
Functional	*Teaching*	4,221	17.5	3,449	13.0	12,203	24.7	19,873	19.9
	Research	2,614	10.9	2,248	8.5	2,761	5.6	7,623	7.6
	Social commitment	236	1.0	293	1.1	2,424	4.9	2,953	3.0
	Total	7,071	29.4	5,990	22.6	17,388	35.2	30,449	30.5
Institutional	*Organizational*	16,544	68.8	20,293	76.6	29,503	59.7	66,340	66.4
	Contextual	438	1.8	221	0.8	2,506	5.1	3,165	3.2
	Total	16,982	70.6	20,514	77.4	32,009	64.8	69,505	69.5
Total		24,053	100	26,504	100	49,397	100	99,954	100

Table 3. Proportional distribution of publications by block and social network

	Social networks				
Blocks	**Topics**	***Twitter* (%)**	***Facebook* (%)**	***LinkedIn* (%)**	**Total (%)**
	Functional Institutional	27.9 72.1	35.3 64.7	29.9 70.1	30.5 69.5
Total		58.2	31.3	10.7	100

5.2. Differences among regions

By thematic blocks (Table 4), each of the universities generated a mean of 992.9 publications of the "institutional" block, with statistically significant differences being observed by region (Anova F value = 16.280; sig.=0.001) and the regions of Latin America and the United States being placed above the mean. In the "functional" block, the mean reached 434.9 publications, with significant differences by region (Anova F value = 16.282; sig.=0.001), with the Latin American region ($\bar{X}$=695.5; σ=692.450) standing out.

Table 4. Anova test of publications by content, blocks and region

Región										
Contents/Blocks	**Europe**		**USA**		**Latin America**		**Total**		**Anova**	
	$\bar{x}$	σ	$\bar{x}$	σ	$\bar{x}$	σ	$\bar{x}$	σ	**Sig***	**F**
Teaching	168.8	121.309	172.4	142.021	488.1	493.643	283.9	344.877	0.001	8.252
Research	104.5	90.929	112.4	91.512	110.4	99.557	108.9	92.955	0.957	0.044
Social commitment	9.4	14.849	14.6	17.288	96.9	142.875	42.2	94.629	0.001	7.824
Functional	**282.8**	**181.945**	**299.5**	**186.919**	**695.5**	**692.450**	**434.9**	**475.620**	**0.001**	**16.282**
Organizational	661.7	444.143	1,014.6	547.627	1,180.1	982.543	947.7	733.128	0.037	3.474
Contextual	17.5	22.142	11.0	8.332	100.2	198.185	45.2	124.758	0.020	4.144
Institutional	**679.3**	**456.979**	**1,025.7**	**551.293**	**1,280.3**	**1132.228**	**992.9**	**817.378**	**0.001**	**16.280**
*Significance value p<0.05										

In the "functional" block, some notable differences are observed by regions. *Teaching* content has an average of 283.9 publications per university, and Latin America is positioned comparatively as the region with the highest activity, both in terms of internal production (24.7%) and concerning mean number of publications ($\bar{X}$=488.1; σ=493.643). Concerning *research* content, the activity of European universities (10.9%) and US universities (8.5%) practically doubles that of Latin American universities (5.6%), but without observing statistically significant differences in terms of the mean ($\bar{X}$=108.9; σ=92.955), although the activity of US universities is slightly higher ($\bar{X}$=112.4; σ=91.512). Regarding *social commitment* content, its proportional weight among universities in Europe and the United States is secondary (< 5%) and has an average of less than 15 publications per university compared to an average of 96.9 publications by Latin American universities.

In the "institutional" block, in the three regions *organizational* contents are of greatest attributed importance (> 65%) and notable and significant differences are also recorded between regions, with a higher mean in the universities of the United States ($\bar{X}$=1,014.6; σ=547.627) and Latin America ($\bar{X}$=1,180.1; σ=982.543). *Contextual* content is less important for European universities (1.8%) and US universities (0.8%) than for Latin American universities (5.1%).

5.3. Differences among social networks

The internal analysis for each social network of the types of content and regions reveals some statistically significant differences (Table 5).

On *Twitter*, within the "functional" block, differences are observed by regions in terms of mean *teaching* content ($\bar{X}$=152.3; σ=188.130) and *social commitment* ($\bar{X}$=21.9; σ=54.396). In both cases, universities in Latin America score a higher mean (*teaching*: $\bar{X}$=242.1; σ=267.983 and *social commitment:* $\bar{X}$=49.9; σ=84.030). In the "institutional" block, there are no differences by region for *organizational* content, although the mean of the United States ($\bar{X}$=715.8; σ=508.852) is slightly higher than the other regions, but differences are observed for *contextual* contents, where Latin American universities achieve a higher mean ($\bar{X}$=57.7; σ=115.918).

On *Facebook*, the published content is related to the "functional" block, as it is the social network with the highest proportion of this type of posts. By regions, statistically significant differences are observed in all contents: in *teaching*, Europe ($\bar{X}$=57.2; σ=52.851) and Latin America ($\bar{X}$=215.4; σ=257.256) behave differently from the United States ($\bar{X}$=28.6; σ=30.268). Regarding *research* content, the European universities publish proportionally more content (11.9%) than the other regions, but for *social commitment*, Latin American universities are more productive ($\bar{X}$=43.3; σ=67.905). In the "institutional" block, the United States is the region that, proportionally, generates the most publications of *organizational* content (76.9%) although Latin America is again the one with the highest output ($\bar{X}$=468.1; σ=432.838). On *contextual* content, the output by universities in Europe ($\bar{X}$=3.1; σ=3.402) and the USA ($\bar{X}$=1.5; σ=2.819) is marginal.

LinkedIn is the social network used least by the universities, although with a greater proportional weight in the set of the three social networks by European universities (Europe = 18.1%, United States = 11.9%, Latin America = 6.5%). It is the only one where no statistically significant differences are observed between regions for any of the published contents. The overall mean of "functional" ($\bar{X}$=45.8; σ=49.399) and "institutional" ($\bar{X}$=107.4; σ=92.293) contents does not vary according to region, although in Europe there is slightly greater interest in the "functional" block ($\bar{X}$=53.4; σ=51.061) and in the United States in the "institutional" block ($\bar{X}$=123.5; σ=86.904).

Table 5. Marginal distribution and Anova test of publications by types of thematic content, social networks and region

Social network	Content	Region						Anova	
		Europe		USA		Latin America			
		n	%	n	%	n	%	Sig*.	F
Twitter	*Teaching*	2,108	15.5	2,501	13.3	6,051	23.5	0.008	5.266
	Research	1,262	9.3	1,571	8.4	1,238	4.8	0.150	1.953
	Social commitment	104	0.8	184	1.0	1,249	4.8	0.004	5.497
	Functional	3,474	25.5	4,256	22.7	8,538	33.1	0.020	4.145
	Organizational	9,831	72.2	14,317	76.4	15,810	61.3	0.069	2.781
	Contextual	309	2.3	177	0.9	1,444	5.6	0.033	3.578
	Institutional	10,140	74.5	14,494	77.3	17,254	66.9	0.810	2.612
	Total	**13,614**	**100**	**18,750**	**100**	**25,792**	**100**		
Facebook	*Teaching*	1,431	23.5	572	12.5	5,385	26.4	0.001	9.584
	Research	723	11.9	380	8.3	1,216	6.0	0.015	4.486
	Social commitment	106	1.7	75	1.6	1,084	5.3	0.001	7.412
	Functional	2,260	37.1	1027	22.4	7,685	37.7	0.001	9.623
	Organizational	3,754	61.6	3,524	76.9	11,702	57.3	0.001	10.325
	Contextual	76	1.2	31	0.7	1,011	5.0	0.018	4.298
	Institutional	3,830	62.9	3,555	77.6	12,713	62.3	0.001	9.985
	Total	**6,090**	**100**	**4,582**	**100**	**20,398**	**100**		
LinkedIn	*Teaching*	682	15.7	376	11.9	767	23.9	0.465	0.774
	Research	629	14.5	297	9.4	307	9.6	0.112	2.265
	Social commitment	26	0.6	34	1.1	91	2.8	0.105	2.330
	Functional	1337	30.7	707	22.3	1165	36.3	0.478	0.747
	Organizational	2,959	68.0	2,452	77.3	1,991	62.1	0.248	1.424
	Contextual	53	1.2	13	0.4	51	1.6	0.112	2.260
	Institutional	3,012	69.3	2,465	77.7	2,042	63.7	0.271	1.333
	Total	**4,349**	**100**	**3,172**	**100**	**3,207**	**100**		

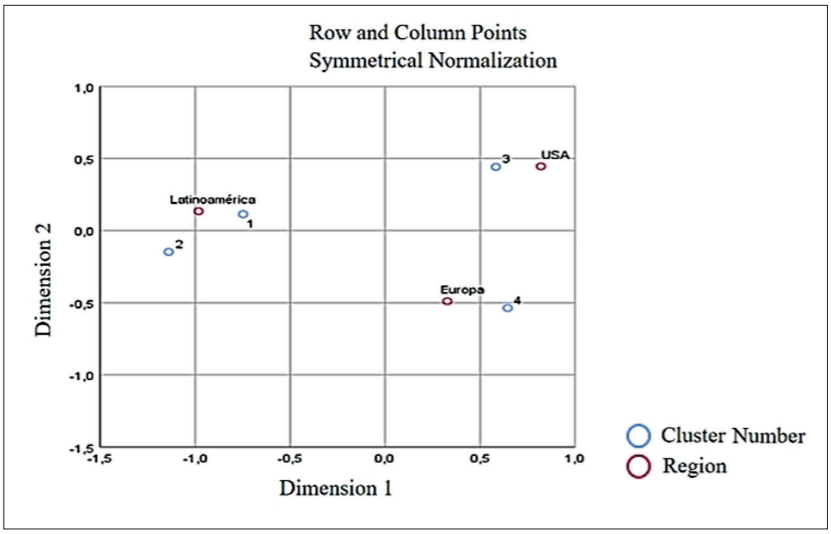
*Significance value p<0.05

Table 6. Final cluster centers

					Anova	
Contents	**Cl. 1**	**Cl. 2**	**Cl. 3**	**Cl. 4**	**F**	**Sig.**
Teaching	21.53	32.53	14.31	11.42	113.239	0.000
Research	6.23	6.38	5.33	15.69	46.380	0.000
Social commitment	4.04	3.83	1.27	1.08	8.543	0.000
Organizational	63.29	55.08	77.64	70.63	72.352	0.000
Contextual	4.91	2.16	1.45	1.16	9.461	0.000
N (universities)	16	12	23	19		

5.4. Groups of universities with homogeneous content

To recognize whether there are groups of universities that may have similar approaches or lines of communication in relation to content, a cluster analysis was carried out. For grouping by means of this analysis, the variables used are the five content categories. In order to avoid the bias produced by the greater or lesser publishing activity observed in the descriptive part of the study, it was considered appropriate to transform them according to the specific weight that each content has on the total categories of content in each of the universities.



Graph 1. Correspondence analysis. Biplot. Cluster-university region.

The two-step cluster test reveals the existence of four clusters with an adequate silhouette measure of cohesion and separation (0.5). Once the number of subgroups was determined, a K-Means analysis was performed to extract the profiles based on the content, obtaining convergence in interaction 3 and generating four homogeneous subgroups of universities (Table 6).

Regarding the region, the X^2 statistical test of independence (6) = 24,680 sig. 0.001, revealed that universities were uniformly represented in the four clusters and that both variables were statistically moderately associated (contingency coefficient 0.511). A subsequent analysis of simple correspondences showed that dimension 1 explained 93.7% of the inertia, allowing to observe, based on the score in dimension 1 (Graph 1), the proximity of the universities of Latin America to clusters 1 and 2, of the USA to cluster 3, and of Europe to cluster 4.

For the strategies used for the dissemination of content, statistically significant differences are also observed by cluster and social network (Table 7). When the content of the "functional" block is disseminated through *Twitter*, in clusters 1 and 2 a greater predisposition is observed for this network than in the rest of the clusters and in the "institutional" block between clusters 1 and 3. When the network used is *Facebook*, cluster 2 differs notably from the

Table 7. Test Anova of the publications by content blocks y clusters

	Bloque Contenido		***Twitter***	***Facebook***	***LinkedIn***
Cluster 1	Functional	$\bar{x}$	372.13	188.56	28.89
		σ	358.51	198.89	9.71
	Institutional	$\bar{x}$	801.38	391.75	71.10
		σ	706.19	436.22	9.71
Cluster 2	Functional	$\bar{x}$	263.08	376.00	41.45
		σ	366.57	447.30	9.13
	Institutional	$\bar{x}$	360.33	392.75	58.55
		σ	305.69	460.18	9.13
Cluster 3	Functional	$\bar{x}$	166.26	76.22	20.98
		σ	167.94	111.26	8.07
	Institutional	$\bar{x}$	661.30	228.00	79.01
		σ	591.24	298.10	8.07
Cluster 4	Functional	$\bar{x}$	175.42	88.95	25.31
		σ	116.27	86.68	8.19
	Institutional	$\bar{x}$	501.68	203.84	74.68
		σ	362.33	193.15	8.19
Anova		F	40.88	22.11	11.21
		Sig.	0.001	0.001	0.001

*Significance value p<0.05

rest when it comes to disseminating "functional" content, and in the "institutional" block, the greatest predisposition is detected in clusters 1 and 2. In *LinkedIn*, cluster 2 shows greater activity in the "functional" block and clusters 3 and 4 in the "institutional" one.

Thus, the 70 universities are distributed among the 4 clusters identified (Table 8), which have the following particularities.

- Cluster 1. Universities with a marked orientation of content from the "institutional" block, with above-mean values for *organizational* and *contextual* topics. The "functional" block has average values for *teaching* content, but above-average values for *social commitment*. It consists of universities in Latin America (62.5%) and also in Europe (25.0%) and the United States (12.5%).
- Cluster 2. Universities with predominant "functional" content, especially for *teaching* content and, to a lesser extent, in *research* and *social commitment*. The "institutional" block shows below-average values for *organizational* content. Composed mainly of universities of Latin America (75.0%) and, to a lesser extent, of Europe (25.0%). No representation of US universities.
- Cluster 3. Universities with a moderate line in the "functional" field, with average values for *teaching* content, but below-average for *research* and *social commitment*. The "institutional" block stands out, especially for *organizational* content. This cluster has the highest proportion of US universities (47.8%), followed by European (34.8%) and Latin American (17.4%).
- Cluster 4. Universities with a predominance of the "functional" block, especially *research* and to a lesser extent *teaching*. The "institutional" block is above the general average, where *contextual* content is marginal. It consists mainly of European universities (52.6%) and, to a lesser extent, US universities (36.8%) and Latin American universities (10.5%).

Table 8. Clusters by universities and regions

Cluster	N	Universities	Distribution by regions
1	16	*Universidad Nacional de Córdoba* *Universidad Nacional de La Plata* *Universidade Federal de Minas Gerais* *Universidade Católica de Rio de Janeiro* *Pontificia Universidad Católica de Chile* *Universidad de Santiago de Chile* *Universidad Nacional de Colombia* *Universidad de los Andes* *Universidad Autónoma de México* *Benemérita Universidad Autónoma de Puebla*	Latin America (62.5%)
		Imperial College London *University of Edinburgh* *Warwick University* *Paris Saclay*	Europe (25.0%)
		Purdue University *University of Illinois*	United States (12.5%).
2	12	*Universidad de Buenos Aires* *Universidade Católica de Rio Grande* *Universidad de Antioquia* *Pontificia Universidad Javeriana* *Universidad Autónoma Metropolitana* *Tecnológico de Monterrey* *Universal Nacional Mayor de San Marcos* *Universidad San Francisco de Quito* *Universidad de la República*	Latin America (75.0%)
		University College London *London School of Economics and Political Science* *Technical University of Munich*	Europe (25.0%)
			United States (0.0%)
3	23	*Princeton University* *Columbia University* *University of Chicago* *Johns Hopkins University* *University of Michigan* *University of North Carolina* *University of California* *University of Washington* *University of Texas* *University of Wisconsin* *University of Maryland*	United States (47.8%)
		King's College London *University of Bristol* *Sorbonne Université* *Paris Sciences et Lettres* *Utrech University* *University of Amsterdam* *University of Oslo* *University of Copenhagen*	Europe (34.8%)
		Universidad Austral *Universidade Federal de Rio de Janeiro* *Universidad de Chile* *Universidad de Concepción*	Latin America (17.4%)
4	19	*University of Oxford* *University of Cambridge* *University of Manchester* *Heidelberg University* *University of Munich* *Swiss Federal Institute Zurich* *University of Zurich* *Swiss Federal Institute Lausanne* *Karolinska Institute* *University of Helsinki*	Europe (52.6%)
		Harvard University *Stanford University* *Massachusetts Institute of Technology* *Caltech* *Yale University* *University of Pennsylvania* *University of Minnesota*	United States (36.8%)
		Universidade de São Paulo *Universidade de Campinas*	Latin America (10.5%).

6. Conclusions

Based on the results obtained, a series of reflections can be made and conclusions drawn.

Regarding the type of content disseminated by the universities (RQ1), institutional publications are seen to be the most frequent, since they account for about two-thirds of the total. Only one-third of the publications are functional. Therefore, it may be argued that the universities use social networks mainly as a strategic tool for positioning the institution, to the detriment of aspects related to their daily activity. Regarding the specific topics, the organizational ones are the most common, well above publications on teaching or research; contextual content and commitment are used marginally by the universities analysed. This reinforces the previous idea of using social networks for institutional positioning, with the support of teaching and, to a lesser extent, research topics.

In all regions (RQ2) the thematic blocks (institutional and functional publications) follow the general pattern previously indicated, with very minor differences. Regarding the specific topics, although the organizational theme is the most prevalent and reinforces institutional positioning, a somewhat differentiated behaviour can be noted depending on the region. Latin American universities give greater weight to teaching activity and social commitment, while those in Europe and the United States give more importance to research topics.

Likewise, each social network (RQ3) has its own particularities, although the general orientation of the contents is quite similar, with a predominance of the institutional block and organizational issues. *Twitter* is the most used social network, where some significant differences can be noted: in Latin America the topics of teaching and social commitment have greater weight, while in Europe and the United States research topics are more relevant. *Facebook* presents some statistically significant differences by region: Europe stands out for research and teaching content, the United States for organizational content, and Latin America for teaching, social commitment and environment. *LinkedIn* is the least used social network. Functional and institutional content, as well as specific themes, do not vary substantially across the regions.

Four homogeneous groups of universities have been identified according to content (RQ4): Two with a predominance of Latin American universities, one with a majority of American, and one with a preponderance of European universities. A first cluster, formed by universities mostly from Latin America, stands out for institutional content. A second group, also with a majority of institutions from Latin America, has a preponderance of functional contents, especially teaching. A third group, mainly made up of universities in the United States, where priority is given to institutional publications (on organizational topics) and with a moderate presence of functional content. And a final cluster, mainly composed of European universities, oriented towards functional content, with greater relevance to research and teaching topics.

Finally, this article proposes some specific variables and dimensions for evaluating the content strategies developed by universities on social networks, integrating diverse knowledge, developed in academia during the last decades. This will allow other researchers to use the analysis methodology in the field, which will strengthen this area of knowledge. In future research it will be relevant to apply it in other social networks, to test the variables and dimensions, and confirm their validity. In addition, this research could be complemented with other studies on the strategies of active presence and interactivity that universities develop on social networks, which will help to understand and evaluate the digital communication of these institutions on said platforms in a global manner.

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