



EVOLUTION OF COMMUNICATION STRATEGIES USED BY UNIVERSITIES IN SOUTHERN SPAIN ON TWITTER

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KEYWORDS

*Communication,
University,
Twitter,
Social media,
Covid-19*

ABSTRACT

This study examines the evolution of communication strategies on Twitter by 12 universities in southern Spain and Portugal during the pre-lockdown, lockdown, and post-lockdown phases of the COVID-19 pandemic. Based on the analysis of over 7,000 posts, changes were identified in formats, objectives, topics, audiences, and performance. Images were predominant (71.1%), and the use of emojis and hashtags increased. During lockdown, the main objective was to inform, while inspiring and educating gained importance afterwards. The most common topics were events, human and institutional support, and the main audience was the general community. Posts saw the highest engagement during lockdown, reflecting strong social commitment. The study concludes that universities adapted effectively to changing contexts, showing that academic quality does not necessarily ensure greater communicative impact. Emotionally intelligent and context-aware communication management was key, positioning Twitter as an essential institutional tool for maintaining connection during a global crisis.

Recibido: 18/ 04 / 2025

Aceptado: 14/ 07 / 2025

1. Introduction

The social network Twitter, among others, is a crucial tool for communication and engagement in the academic sphere. Its ability to facilitate the rapid dissemination of information, encourage interaction between students, academics, and the community at large, and serve as a platform for promoting institutional events and achievements makes it an invaluable resource in the digital age (Kimmons & Veletsianos, 2016). In addition, Twitter allows universities to build a strong brand identity and maintain an open dialogue with their audiences, which is essential for transparency and accountability in higher education (Manca & Ranieri, 2016). In this context, this study analyzes, for the first time, the use of Twitter by universities in southern Spain and Portugal and its impact on institutional communication.

Previously, studies such as Simón-Onieva (2017) conducted a content analysis to assess communication on Twitter (X) by the 10 universities in Andalusia (Spain). Aldeanueva-Fernández and Arrabal-Sánchez (2018) analyzed the behavior on Twitter (X) of all Spanish universities on the subject of corporate social responsibility (CSR) and concluded that social responsibility is not a prominent topic in the external communication of higher education institutions. Therefore, they propose lines of research based on a system of indicators related to social responsibility.

Ebrahim and Seo (2019) conducted a content analysis of 537 images posted on Twitter (X) by universities in Kuwait, King Saud University in Saudi Arabia, and the United Arab Emirates University, demonstrating that public universities frequently used their social media channels to promote the political agenda of their respective governments. Segura-Mariño et al. (2020) designed a methodology to carry out comparative evaluations between the communication strategies that HEIs develop on Facebook and Twitter (X), regardless of the country of origin. They found statistically significant differences depending on the profile of the HEIs, but concluded that the success of university communication on social media is associated with the degree of importance that authorities attach to these channels.

Ferrer-Serrano et al. (2020) studied the communication of all HEIs in Spain on Twitter (X) from January to April 2020. Among the conclusions, they highlight the increase in user engagement with university profiles during the pandemic. Martínez-Cardama and Pacios (2020) examined how university libraries in Spain communicated their adaptation in service provision via Twitter (X) during the first weeks of the COVID-19 lockdown. The results highlight the fundamental value of libraries in response to the health emergency, as well as the agility with which they have acted to transform and promote their new approach to work.

Capriotti et al. (2023) examined the variety of content that universities disseminate on Twitter (X), Facebook, and LinkedIn in Europe, the United States, and Latin America. They found that, across all regions and platforms, most universities opt for an institutional content strategy, using social media primarily as a strategic tool to strengthen their institutional position rather than to report on daily activities. Also with the aim of analyzing the social media activity of the 40 European university consortia belonging to the first and second calls, García-Gordillo et al. (2023) initially examined the presence of these entities on digital platforms. They identified Twitter (X) as the most widely used network, although the results indicate limited interaction and low use of the networks.

In this context, the present study seeks to analyze the use of Twitter by universities in southern Spain and its impact on institutional communication and the participation of the academic community.

It is worth mentioning that longitudinal studies offer valuable benefits by providing a dynamic and detailed view of how variables evolve over time. This approach allows us to capture changes and patterns that might go unnoticed in cross-sectional studies (Ortiz and Greene, 2007). Therefore, analyzing how universities have adjusted their approaches on Twitter (X) in the face of an unprecedented global event such as the pandemic provides a unique perspective on their ability to react and their skill in maintaining consistency in communication, especially considering that economic, social, educational, health, and political measures had been adopted in different ways in each region of the world, even within each country.

Thus, this research seeks to delve into how universities coped with the abrupt transformation imposed by the situation, and how this reconfiguration influenced their communication approach on Twitter.

2. Research objectives

The main objective is to analyze the online communication strategies of universities in southern Spain during three academic years: 2018-2019, 2019-2020, and 2020-2021, which correspond to the pre-lockdown, lockdown, and post-lockdown periods of the global COVID-19 pandemic.

To achieve this main objective, the following specific objectives (SO) are established:

- SO1: Identify the format characteristics of the Twitter posts of universities in southern Spain before and after lockdown.
- SO2: Distinguish the types of content addressed on Twitter by universities in southern Spain before and after lockdown.
- SO3: Recognize the audience targeted by southern peninsular universities through their posts on Twitter before and after lockdown.
- SO4: Evaluate the performance of messages posted on Twitter by southern peninsular universities before and after lockdown and verify the relationship between followers and the university's position in the SJR.

The following research hypotheses have been formulated:

1. Universities in southern Spain modify the format of their publications during the periods analyzed, and the presence of emojis, hashtags, and links in the text of publications from universities in southern Spain varies for each period analyzed.
2. Universities in southern Spain modify the objectives, topics, and audiences of their publications in their communication strategies, depending on the period of study and for each of the social networks analyzed.
3. The older a university is, the more followers it has on Twitter and the better its position in Scimago Journal and Country Rank (SJR), as well as the more publications and interaction with its followers.

3. Methodology

Conventional categorizations and structures often fail to adequately represent university systems. Global university rankings prove to be a valuable source of data and a way to improve the visibility and prestige of higher education institutions; the Scimago Journal and Country Rank offers a comprehensive description of scientific output and indicators that measure performance, influence, and academic quality (Bustos-González, 2019). For this study, 12 universities in southern Spain have been selected and, for practical purposes in reading the thesis, have been ordered according to their position in the 2022 SJR ranking (Table 1).

Table 1. Universities in southern Spain

Universidades	Siglas	Códigos
Universidad de Granada	UGR	U1
Universidad de Sevilla	US	U2
Universidad de Córdoba	UCO	U3
Universidad de Málaga	UMA	U4
Universidad Pablo de Olavide	UPO	U5
Universidad de Almería	UAL	U6
Universidad de Jaén	UJA	U7
Universidad de Cádiz	UCA	U8
Universidad de Huelva	UHU	U9
Universidad del Algarve	UALG	U10
Universidad de Loyola	ULO	U11
Universidad Internacional de Andalucía	UNIA	U12

Source: Own elaboration, 2022

It should be noted that all of these are higher education institutions in Spain, with the exception of the University of Algarve (Portugal), that all are public except for Loyola University, and that only the

International University of Andalusia does not have a presence on SJR, which is why it ranks last in Table 1.

Twitter has become an essential communication channel for higher education institutions, and it was observed that it is the social network with the most followers for these universities (Table 2).

Table 2. Followers on Facebook and Twitter (X) of universities in southern Spain

Siglas	Facebook	Twitter (X)	Instagram	YouTube
UGR	96 769	132 193	14 783	7400
US	88 228	127 721	31 782	5510
UCO	18 668	48 823	6038	529
UMA	36 018	119 781	20 719	1610
UPO	17 738	30 946	7325	
UAL	30 000	36 361	509	1080
UJA	32 528	807	8618	807
UCA	35 036	50 556	9323	2830
UHU	8925	33 534	5279	847
UALG	43 947	9072	8900	2130
ULO	7254	9910	3508	2150
UNIA	12 245	10 815	610	74

Source: Own elaboration, 2022

On the other hand, rather than a cross-sectional study conducted at a specific point in time and in which data from different objects of analysis are collected at a single moment (Blank, 2013), this study has opted to conduct a longitudinal study analyzing how universities in southern Spain have developed communication on the two social networks over three academic years, which have marked a before and after in terms of institutional communication due to the global COVID-19 pandemic.

The units of analysis are the messages that the 12 universities posted on Facebook and Twitter (X) during the three academic years 2018-2019, 2019-2020, and 2020-2021, each dated between September 1 and July 31. This makes it possible to understand how university communication has developed in southern Spain before, during, and after the pandemic lockdown. The FanPage Karma tool was used to extract the sample of posts, sorted by period and engagement. This tool is often used in social science studies to perform quantitative analyses of the social media profiles being researched. It offers the possibility of obtaining different metrics based on the data previously configured. The most common are analyses of interactions, number of comments, number of followers, number of likes, etc.

3.1 Research techniques and instruments

A code book was developed consisting of 15 variables divided into five categories (Table 3).

Table 3. Content analysis code book

Categories	Variables
1. General information about universities and their presence on Facebook and Twitter (X)	1. Name of the university
	2. Type of financing
	3. Year of foundation
	4. Position in Scimago Journal and Country Rank (SJR)
	5. Number of followers
	6. Interaction of publications
2. Format characteristics	7. Format
	8. <i>Emoji</i>
	9. Link
	10. <i>Hashtag</i>
3. Types of content	11. Objective

	12. Topic
4. Hearing	13. Audience
5. Performanceo	14. Number of likes
	15. Interaction

Source: Own elaboration, 2022

This instrument is designed based on the contributions of various researchers who have studied university communication on social media (Almeida and Salomé Morais, 2020; Duque Rengel and Valarezo González, 2021; Ebrahim and Seo, 2019; Motta and Barbosa, 2018; Pérez-Bonaventura et al., 2021; Saraite-Sariene et al, 2019; Segura-Mariño et al., 2020; Simón-Onieva, 2017; Thelen and Linjuan Men, 2018; Vegas Sernaqué, 2022). The categories and variables were adapted in order to adjust the instrument to the objectives of this research.

The first category addresses general aspects that identify the institutional profile of each university and its presence on social media. The variables include: the name of the institution, the type of funding (public or private), the year of foundation, its position in SJR, the number of followers on Twitter (X), and the interaction achieved in the messages posted on both social media platforms.

La segunda categoría aborda las características de formato o del aspecto visual que tiene cada mensaje analizado. De modo que, en las variables se incluye: el formato propiamente (video, foto, solo texto y *retweet* o compartido), la presencia o no de *emojis* en la descripción, la presencia de enlaces y la presencia de *hashtags*, así mismo en la descripción.

The third category deals with types of content. So, the variables include: the objective and the topic. Five objectives have been proposed: 1) Inform, when something that has happened or is happening at the time of publication is reported; 2) Promote, when action is encouraged; 3) Educate, when the content of the publication provides knowledge or skills; 4) Promote online reaction or response to that same publication by readers; and 5) Inspire or motivate the recipients of the messages.

On the other hand, with regard to types of content, it has also been proposed to identify 11 topics: 1) Institutional, when referring to the university in general, the campus, or infrastructure; 2) Of social interest, topics that interest society as a whole; 3) Human support from the university to society; 4) Research and Development, expert opinion or contributions from scientific sources; 5) Academia, or information on the academic offering or management of undergraduate, graduate, or continuing education programs; 6) Academic Mobility Programs; 7) Accommodation or residence; 8) Events, which may be institutional, educational, social, cultural, sporting, among others; 9) Teleworking; 10) Complaints received on social media or other channels; and 11) Fake news or hoaxes that the university denies.

The fourth category addresses the audience and has a single variable in this regard, with the aim of identifying which segments are targeted by the messages posted by universities on the two social networks. Eight groups have been proposed: 1) Professors; 2) University administrative staff; 3) Current students; 4) Potential students; 5) Alumni; 6) Media; 7) Companies; and 8) General community.

The last and fifth category addresses the performance of the messages that universities in southern Spain have posted on Facebook and Twitter (X) during the three academic years under study.

To validate the instrument, the data were collected by two people who were trained to complete the code book in a Microsoft Excel document; Subsequently, a document was configured in the SPSS statistical program in which both the variables and the collected data were incorporated, and Krippendorff's alpha was calculated to determine the level of reliability or agreement between the responses of the two people (specifically on the variables in categories 2, 3, and 4). An average value of $\alpha_k = 0.90$ was achieved, therefore the instrument has a high level of objectivity, since according to Krippendorff (2011), the instrument is considered objective when an average value of $\alpha_k \geq 0.70$ is obtained.

Using the online tool FanPage Karma, the 100 most outstanding posts (those that achieved the most engagement) were identified for each academic year and for each social network. A total of 7,191 messages were analyzed, as the UPO published 91 messages on Twitter in 2019, rather than 100. In this sense, the potential and suitability of this tool can be seen in the scientific evidence of the numerous academic articles that use it.

For the first category, the source for obtaining institutional profile data was the official website of each university in southern Spain, while the source for obtaining the position in the global academic ranking was the official website of Scimago Journal and Country Rank (SJCR). For the second category on format characteristics, direct observation of each message published by higher education institutions, both on Facebook and Twitter, was essential.

On the other hand, for the third category on content types, in-depth observation of the visual elements was essential, as well as a comprehensive reading of the description accompanying each publication, in order to identify the objective and the topic addressed.

Similarly, for the fourth category on audience, it was necessary to observe the visual elements and comprehensively read the descriptions to identify which user segments the messages were aimed at. Finally, for the fifth category, the online tool FanPage Karma was again important. The statistical tests chosen were Pearson's correlation, analysis of variance (ANOVA), and chi-square.

4.1 Twitter post format (X)

Table 4 shows that, of the total number of posts over the three academic years, photos are the most commonly used format on Twitter (71.1%) by universities in southern Spain, followed by text only (15.5%), video (13.4%), and retweets (0.1%).

Table 4. Format on Twitter (X) during the three years of the study

Format	Total publications in the three years of the study
Photo	71,1%
Video	13,4%
Only text	15,5%
<i>Retweet</i>	0,1%
Total	100%

Source: FanpageKarma. Own elaboration, 2022

Table 5 below shows that, within each academic year (pre-lockdown, lockdown, and post-lockdown), in the 2018-2019 academic year there were more photos (75.3%), followed by videos (12.7%), then text only (11.8%), and finally retweets only (0.3%). Similarly, in the 2019-2020 academic year, there were more photos (68.8%), followed by videos (16.5%), then text only (14.8%) and finally retweets only (0.0%). However, in the 2020-2021 academic year, although there were also more photos (69.2%), there were more posts with only text (19.8%), followed by videos (11.0%) and finally retweets (0.0%).

These changes in format preference over the three academic years may reflect adaptations in universities' communication strategies to meet the changing needs and preferences of their audience, especially in a context marked by the pandemic and associated restrictions.

Table 5. Format on Twitter (X) within each year of study

Format	Year 2018-2019	Year 2019-2020	Year 2020-2021
Photo	75,3%	68,8%	69,2%
Video	12,7%	16,5%	11,0%
Only text	11,8%	14,8%	19,8%
<i>Retweet</i>	0,3%	0,0%	0,0%
Total	100%	100%	100%

Source: Own elaboration, 2022

Table 7 below shows the use of each format throughout the periods (pre-lockdown, lockdown, and post-lockdown); photography was used most in the first period (35.1%). Video was used most in the second period (41.2%), and text-only was used most in the third period (42.9%).

Table 7. Format on Twitter (X) throughout each year of study

Format	Year 2018-2019	Year 2019-2020	Year 2020-2021	Total
Photo	35,1%	32,3%	32,5%	100%
Video	31,4%	41,2%	27,4%	100%
Only text	25,2%	31,9%	42,9%	100%

Source: Own elaboration, 2022

Based on all this information, the Chi-square test was calculated. There are statistically significant differences between the format and the period [$\chi^2(6) = 50.639$; $p = 0.000$].

4.1.1 Emojis on Twitter

Of the total number of posts in the three academic years, emojis were used in 62% of posts and not used in 38%. Table 8 shows that, within each academic year (pre-lockdown, lockdown, and post-lockdown), in the 2018-2019 academic year, there were more posts that included emojis (52.6%) than posts that did not include emojis (47.4%). In the 2019-2020 academic year, there were also more posts that included emojis (64.2%) than posts without emojis (35.8%). Similarly, in the 2020-2021 academic year, more messages with emojis (69.0%) were published than without emojis (31.0%).

Table 8. Emojis on Twitter (X) within each year of study

Emojis	Year 2018-2019	Year 2019-2020	Year 2020-2021
Yes	52,6%	64,2%	69,0%
No	47,4%	35,8%	31,0%
Total	100%	100%	100%

Source: Own elaboration, 2022

Table 9 shows that emojis were used most frequently in the third year (37.2%). Therefore, the opposite is true when we observe that posts that do not include emojis are mostly from the first period (41.3%).

Table 9. Emojis on Twitter (X) throughout each year of the study

Emojis	Year 2018-2019	Year 2019-2020	Year 2020-2021	Total
Yes	28,2%	34,6%	37,2%	100%
No	41,3%	31,4%	27,3%	100%

Source: Own elaboration, 2022

Based on all this information, the Chi-square test was calculated, revealing statistically significant differences between the presence of emojis in Twitter posts (X) and the period [$\chi^2(2) = 71.478$; $p = 0.000$]. These findings suggest that context and circumstances may influence the prevalence and preference for the use of emojis in Twitter posts over these three academic years.

4.1.2 Links on Twitter (X)

Of the total number of posts over the three academic years, 76.4% included links and 30.6% did not. This suggests a trend toward the inclusion of external resources or web references in posts made on Twitter by universities in southern Spain. Table 10 shows that, within each academic year, there were more posts that included links than posts that did not include links.

Table 10. Links on Twitter (X) within each year of study

Links	Year 2018-2019	Year 2019-2020	Year 2020-2021
Yes	74,0%	71,9%	62,2%
No	26,0%	28,1%	37,8%
Total	100%	100%	100%

Source: Own elaboration, 2022

Table 11 below shows the use of links throughout the periods studied (pre-lockdown, lockdown, and post-lockdown); links were used most frequently in the first year (38.8%), and publications that do not include links are mostly from the third period (45.2%).

Tabla 12. Links on Twitter (X) throughout each year of study

Links	Year 2018-2019	Year 2019-2020	Year 2020-2021	Total
Yes	35,5%	34,6%	29,9%	100%
No	28,2%	30,6%	41,1%	100%

Source: Own elaboration, 2022

Based on all this information, the Chi-square test was calculated, and the result was that there are no statistically significant differences between the presence of links in Twitter posts (X) and the period [$\chi^2(2) = 3.500$; $p = 0.174$]. This indicates that, although there may be variations in the use of links over time, these differences are not significant enough, therefore the use or non-use of links in Twitter posts is not an issue that is influenced by the context of the COVID-19 pandemic.

4.1.3 Hashtags on Twitter (X)

Of the total number of posts over the three years, 66.1% used hashtags and 33.9% did not. This indicates the prevalence of hashtags as a common strategy on Twitter. Table 13 shows that, in the 2018-2019 academic year, there were more posts that included hashtags (63.8%) than posts without hashtags (36.2%). In the 2019-2020 academic year, there was a slight change, but there were still more posts that included hashtags (68.6%) than posts without hashtags (31.4%). In the 2020-2021 academic year, there were also more posts that included hashtags (65.9%) than posts that did not include hashtags (34.1%).

Table 13. Hashtags on Twitter (X) within each year of study

Hashtags	Year 2018-2019	Year 2019-2020	Year 2020-2021
Yes	63,8%	68,6%	65,9%
No	36,2%	31,4%	34,1%
Total	100%	100%	100%

Source: Own elaboration, 2022

Table 14 identifies the use of hashtags throughout the periods (pre-lockdown, lockdown, and post-lockdown); hashtags were used most frequently in the second year (34.7%). Posts that do not include hashtags are mostly from the first period (35.4%).

Tabla 14. Hashtags on Twitter (X) throughout each year of study

Hashtags	Year 2018-2019	Year 2019-2020	Year 2020-2021	Total
Yes	32,0%	34,7%	33,3%	100%
No	35,4%	30,9%	33,6%	100%

Source: Own elaboration, 2022

Based on all this information, the Chi-square test was performed, and the result is that there are statistically significant differences between the presence of hashtags in Twitter posts (X) and the period [$\chi^2(2) = 6.261$; $p = 0.044$]. The data reveal that the use of hashtags in Twitter posts (X) is a common strategy, with a steady increase over three academic years. However, during the post-lockdown period, there was a slight decline in their use. This suggests that social media strategies evolve over time and are influenced by circumstances.

The Chi-square test confirms that the publication period is a significant factor in the presence of hashtags. These findings highlight the importance of adapting social media strategies according to context to maximize their effectiveness.

4.2 Types of content on Twitter

Two key variables were identified in the Twitter content category (X), which are as follows: the purpose of the message and the topic addressed. These aspects provide insights into how universities in southern Spain connect with their audience on this platform. These factors allow us to understand how Twitter

posts are adjusted and changed in response to the changing dynamics of the social network and the preferences of followers, adapting to the realities of the environment.

4.2.1. Objectives of Twitter messages

With regard to the objectives of communications on social media, this study has proposed identifying five types of objectives, as detailed in the methodology. 1) Inform, 2) Promote, 3) Educate, 4) Encourage readers to react or respond online to the post, and 5) Inspire or motivate the recipients of the messages. Thus, Table 15 shows that, of the total number of posts over the three academic years, the objective with which southern peninsular universities have posted most on Twitter is to inform (58.6%), followed by promoting (21.5%), inspiring (15.9%), educating (2.7%), and finally promoting reaction (1.3%).

Table 15. Objectives of Twitter posts (X) over the three years of the study

Objectives	Total of publications in the three year study
Inform	58,6%
Promote	21,5%
Educate	2,7%
Promote the reaction	1,3%
Inspire	15,9%
Total	100%

Source: Own elaboration, 2022

Table 16 summarizes that in the 2018-2019 academic year, the main objective of the publications was to inform (51.4%), followed by promoting (29.7%), then inspiring (14.4%), then educating (2.7%) and finally, encouraging reaction (1.7%). In the 2019-2020 academic year, the main objective of publications was to inform (74.6%), followed by promoting (16.9%), inspiring (6.7%), educating (1.0%), and finally, promoting reaction (0.8%). Finally, in the 2020-2021 academic year, the objective of the publications was to inform (49.6%), followed by inspiring (26.5%), promoting (18.0%), educating (4.4%), and finally promoting reaction (1.5%).

Table 16. Twitter post targets (X) within each year of study

Objectives	Year 2018-2019	Year 2019-2020	Year 2020-2021
Inform	51,4%	74,6%	49,6%
Promote	29,7%	16,9%	18,0%
Educate	2,7%	1,0%	4,4%
Promote the reaction	1,7%	0,8%	1,5%
Inspire	14,4%	6,7%	26,5%
Total	100%	100%	100%

Source: Own elaboration, 2022

Table 17 shows, for each objective, the period in which they were most prevalent (pre-lockdown, lockdown, and post-lockdown). Informing was the most sought-after objective in the second period (42.7%), followed by the first (29.2%) and the third (28.2%). Promoting was the most sought-after objective in the first period (45.9%), followed by the third (27.8%) and the second (26.3%). Educating was the most sought-after objective in the third period (54.2%), followed by the first (33.3%) and the second (12.5%). Promoting reaction was the most sought-after objective in the first period (42.6%), followed by the third period (38.3%) and the second period (19.1%). Finally, inspiring was the most sought-after objective in the third period (55.5%), followed by the first period (30.4%) and the second period (14.1%).

Table 18. Twitter post targets (X) throughout each year of study

Objectives	Year 2018-2019	Year 2019-2020	Year 2020-2021	Total
Inform	29,2%	42,7%	28,2%	100%
Promoter	45,9%	26,3%	27,8%	100%
Educate	33,3%	12,5%	54,2%	100%
Promote the reaction	42,6%	19,1%	38,3%	100%
Inspire	30,4%	14,1%	55,5%	100%

Source: Own elaboration, 2022

Based on all this information, the Chi-square test was calculated, and the result is that there are statistically significant differences between the objective of Twitter posts (X) and the period [$\chi^2(8) = 315.695$; $p = 0.000$].

In general, the main objective of the posts was to inform, with an increase during the lockdown period (2019-2020). In addition, it was observed that promotion was more prominent before the lockdown, while education stood out mainly in the post-lockdown period. On the other hand, the intention to inspire became more evident during the third period: universities adapted their communication objectives according to the circumstances.

4.2.2 Twitter (X) message topics

With regard to content types, we sought to identify the following topics: 1) Institutional 2) Social interest 3) Human support from the university to society; 4) Research and Development 5) Academia 6) Mobility Programs 7) Accommodation or residence; 8) Events; 9) Teleworking and 10) Complaints.

Table 19 shows that, of the total number of posts in the three academic years (pre-lockdown, lockdown, and post-lockdown), the most frequently discussed topics on Twitter (X) were, in the following order: Events (26.9%), Human support (22.7%), Institutional (15.0%), Academia (13.7%), Research and Development (12.0%), Social Interest (7.0%), Mobility Programs (0.9%) as well as Teleworking (0.9%), and then Accommodation or Residence (0.3%) as well as Complaints (0.3%) and Fake News (0.3%).

Table 19. Topics of posts on Twitter (X) during the three years of the study

Topics	Total publications in the three years of the study
Institutional	15,0%
Of social interest	7,0%
Human support	22,7%
Research and development	12,0%
Academia	13,7%
Mobility programs	0,9%
Accommodation or residence	0,3%
Events	26,9%
Teleworking	0,9%
Complaints	0,3%
Fake news	0,3%
Total	100%

Source: Own elaboration, 2022

In the 2018-2019 academic year, the most frequently addressed topics were, in the following order: Events (32.2%), Human Support (21.7%), Academia (20.9%), Research and Development (10.2%), Institutional (9.9%), Social Interest (3.9%), Mobility Programs (1.0%), Accommodation or Residence (0.3%), and finally no publications on Teleworking (0.0%), Complaints (0.0%) and Fake News (0.0%).

In the 2019-2020 academic year, the most frequently addressed topics were, in the following order: Human support (28.0%), Events (23.2%), Academia (13.8%), Institutional (12.3%), Research and

Development (12.0%), Social Interest (5.8%), Teleworking (1.9%), Mobility Programs (1.2%), Fake News (0.8%), Complaints (0.7%), and Accommodation or Residence (0.3%).

In the 2020-2021 academic year, the most frequently addressed topics were, in the following order: Events (25.3%), Institutional (23.0%), Human support (18.5%), Research and Development (13.8%), Social interest (11.3%), Academia (6.5%), Teleworking (0.7%), Mobility programs (0.4%), Complaints (0.3%), Accommodation or residence (0.2%) and Fake news (0.1%); all of this is shown in Table 20:

Table 20. Twitter post topics (X) within each year of study

Topics	Year 2018-2019	Year 2019-2020	Year 2020-2021
Institutional	9,9%	12,3%	23,0%
Of social interest	3,9%	5,8%	11,3%
Human support	21,7%	28,0%	18,5%
Research and development	10,2%	12,0%	13,8%
Academia	20,9%	13,8%	6,5%
Mobility Programs	1,0%	1,2%	0,4%
Accommodation or residence	0,3%	0,3%	0,2%
Events	32,2%	23,2%	25,3%
Teleworking	0,0%	1,9%	0,7%
Complaints	0,0%	0,7%	0,3%
<i>Fake news</i>	0,0%	0,8%	0,1%
Total	100%	100%	100%

Source: Own elaboration, 2022

The Chi-square test was calculated, and the result is that there are statistically significant differences between the topic addressed on Twitter (X) and the period [$\chi^2(20) = 324.685$; $p = 0.000$].

4.3 Twitter audience

By understanding each message, it is possible to interpret who the intended recipients are; eight groups were thus established: 1) Professors; 2) University administrative staff; 3) Current students; 4) Prospective students; 5) Alumni; 6) Media; 7) Companies; and 8) General community—this is when the publication is aimed indiscriminately at both internal audiences such as students and teachers, among others, and external audiences such as parents, companies, and the media, among others. The groups that universities in southern Spain have most sought to target on Twitter (X) (Table 21) were, in the following order: general community (61.2%), media (27.9%), potential students (4.4%), alumni (2.9%), current students (2.6%), companies (0.7%), teachers (0.3%), and administrative staff (0.0%).

Table 21. estudio Twitter post audiences over the three years of the study

Audience	Total of publications in the three year study
Teachers	0,3%
Administrative Staff	0,0%
Current students	2,6%
Potential students	4,4%
Alumni	2,9%
Medios	27,9%
Companies	0,7%
Community	61,2%
Total	100%

Source: Own elaboration, 2022

Table 22 below shows the percentages of audiences most frequently targeted on Twitter (X) by universities in southern Spain, by period:

Table 22. Twitter post views (X) within each year of study

Audiences	Year 2018-2019	Year 2019-2020	Year 2020-2021
Teachers	0,3%	0,6%	0,2%
Administrative Staff	0,0%	0,1%	0,0%
Current students	1,8%	2,6%	3,3%
Potential students	3,5%	4,8%	5,0%
Alumni	1,8%	17,0%	5,4%
Media	32,1%	23,2%	28,4%
Companies	0,5%	0,5%	1,1%
Community	60,1%	66,8%	56,6%
Total	100%	100%	100%

Source: Own elaboration, 2022

Based on all this information, the Chi-square test was calculated, which indicated that there are statistically significant differences between the audience targeted by universities in southern Spain on Twitter (X) and the period [$\chi^2(14) = 242.681$; $p = 0.000$].

4.4 Performance of Twitter posts (X)

The last category of this study addresses the performance of posts made by universities in southern Spain on Twitter (X) during the three academic years. The variables include the number of likes and the interaction rate in decimals.

4.4.1 Number of likes on Twitter messages (X) and interaction rate

Table 23 shows that, in the pre-lockdown period, universities in southern Spain achieved an average of 24.74% likes on Twitter (X) for their posts. During lockdown, they achieved an average of 41.42% likes, and in the post-lockdown period, they achieved an average of 35.97% likes.

Table 23. Average number of likes on Twitter posts (X) over the three years of the study

Period	Average	Deviation	Mínimum	Maximum
2018-2019	24,74	43,863	1	1181
2019-2020	41,42	67,146	2	867
2020-2021	35,97	50,312	1	713

Source: Own elaboration, 2022

The results of the ANOVA test confirm that there are statistically significant differences between the number of likes on Twitter (X) and the study period [$F(2) = 28.882$; $p = 0.000$]. During lockdown, a higher average number of likes was obtained, followed by the post-lockdown period and finally the pre-lockdown period. Finally, in the pre-lockdown period, universities in southern Spain achieved an average of 0.0009 interactions on Facebook for their posts; during lockdown, they achieved an average of 0.0014; and in the post-lockdown period, they achieved an average of 0.0011. The results of the ANOVA test indicate that there are statistically significant differences between the interaction rate on Twitter (X) and the study period [$F(2) = 11.747$; $p = 0.000$]. During lockdown, a higher average interaction rate was obtained, followed by the post-lockdown period and finally, the pre-lockdown period.

5. Discussion and conclusions

Universities have been active on Twitter, nurturing and strengthening their online presence and audience. They have increased their activity on Twitter, with the average number of posts increasing each year of study on this social network.

Furthermore, according to Segura-Mariño et al. (2020), older universities have a greater number of followers, and universities that are better positioned also have a greater number of followers. It is likely that universities with more history and tradition offer an image of greater prestige and trust, creating solid online communities given the numerous people and entities that join each academic year to increase the online community. This fact may lead to improvements year after year thanks to the feedback provided in their comments and the eWOM generated by the users themselves.

In addition, the universities with the best positioning in Scimago Journal Rank have more followers. These results suggest that recognition for the age and prestige offered by universities may influence the number of followers.

However, age is not associated with greater interaction, as there is no correlation between the year of foundation of universities in southern Spain and the level of interaction on Twitter. Consequently, older universities do not have more interaction. The interaction rate was highest during the lockdown period. Activity, online marketing strategies, the type of content published, changes in algorithms, and online content saturation are factors that can affect interaction regardless of the age of the university.

Universities with a higher SJR ranking do not have more interaction on Twitter. Academic prestige influences interaction on social media, although this is not necessarily reflected in a greater number of posts. Seniority is associated with a greater number of messages posted, with results in the average Pearson correlation. Twitter posts (X) have increased over time, keeping communication with stakeholders increasingly active.

The number of posts has increased each year analyzed. According to Simón-Onieva (2017), increasing the number of posts does not guarantee more interaction. There are other factors that affect interaction. According to authors Peruta and Shields (2018), user-generated content, content that addresses current social issues, and the inclusion of images in posts increase interaction, but there is no correlation between the number of posts and interaction.

The universities with the best SJR rankings are not those with the most posts on Twitter (X). Academic quality is not associated with a higher number of posts. Academic prestige influences interaction, but interaction is not determined by a higher number of posts. Other factors can influence interaction, such as content creation strategies, digital marketing, etc.

Studies by Amaral and Santos (2020) state that the most widely used format on Twitter is video. In this study, the format most used by all universities is photos (71.1%), followed by video (13.4%) on Twitter. Text accounts for 15.5% and, finally, retweets account for 0.1%.

Fluctuations are observed in each year analyzed for the formats. We found that before lockdown, photos were the most prominent element, at 75.3%. Video during lockdown accounted for 16.5% and after lockdown 69.2%. The fact that publications vary from one period to another indicates that universities employ communication strategies that adapt to the existing and changing social reality, remaining flexible over the course of the three academic years analyzed, always responding to the needs and demands of their audiences.

There is a clear preference for the use of images in the posts made on Twitter (X) by universities in southern Spain during the three academic years associated with pre-lockdown, lockdown, and post-lockdown.

The use of emojis in more than half of the posts (62.0%) reflects a slight preference for incorporating visual and emotive elements into communication on Twitter. This practice could also be contributing to more effective and engaging communication in academic posts.

The results of the use of different formats suggest that academic institutions have adapted their communication strategy over the three academic years studied, possibly in response to the changing circumstances imposed by the pandemic and restrictions. The preference for certain types of content, such as photos, videos, or text, varies from one period to another, reflecting the need to remain flexible and adjust communication strategies to meet audience demands.

The changes in the use of emojis suggest an evolution in the communication strategy of universities, possibly as a means to connect more effectively with their audience and express emotions in a context of change and challenges, such as those associated with the pandemic. Therefore, context and circumstances may influence the prevalence and preference for the use of emojis in Twitter posts throughout these three academic years

The use of links is not an issue that is influenced by the context of the COVID-19 pandemic, as accessibility to information sources is favored during all periods. In contrast, the use of hashtags peaked during the lockdown period

The objectives of informing and promoting are the most prominent in the three academic years analyzed. The objective of promoting stands out before the lockdown. In the 2020/2021 academic year, the objective of inspiring and educating predominates. Universities changed their communication strategy, adapting to the circumstances brought about by the pandemic, prioritizing objectives such as promoting the institution itself over other necessary objectives during these periods, such as informing, educating, or inspiring. The most prominent topics in the total number of publications are Events 26.9%, Human Support 22.7%, and Institutional 15%. Universities have used different themes for each period. Academia stood out in the pre-lockdown period (50.7%). During lockdown, fake news (90.9%) was prominent, and in the post-lockdown period, social interest (53.8%) was the most prominent topic.

The communication strategy implemented by universities has been constantly evolving and at the forefront at every stage in order to report on current issues that institutions have addressed in relation to research, technical and health advances, aid, and human support, without forgetting the academic and institutional nature of universities.

The audience groups that universities in southern Spain have sought to target most have been the general community (61.2%). For each academic year analyzed, it can be seen that publications aimed at the entire community on each social network also predominate.

The communication strategy employed by universities in southern Spain has taken its audiences into account at every stage, knowing how to address each of them at the moments when social reality most demands their attention.

These differences between periods mean that universities adapt their communication style to their audience, taking into account the context and social demand for information. They take care of their channels, understanding them as ways to inform and listen to their audiences, encourage interaction, and take care of the content and topics to be covered in their publications in favor of information. All of this is carried out through communication management, where communication strategies are increasingly prioritized, according to previous studies such as that by Moreno et al. (2017).

The great social and research work carried out by universities in southern Spain during the lockdown period has been recognized and valued by their audiences, who interacted with and liked their Twitter posts.

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