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SCIENCE COMMUNICATORS ON TIKTOK: CONTENT STRATEGIES IN THE DIGITAL AGE

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KEYWORDS

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ABSTRACT

This research analyses the methods and content strategies used by science communicators on TikTok. The aim is to understand these dynamics and identify aspects of the platform that facilitate science communication. Through an online survey, it is observed that the late afternoon and evening hours are suitable for posting science-related videos. These productions should have a humorous and informative tone. In addition, these prosumers need to be familiar with aspects such as algorithms, hashtags, visual effects and current trends in order to discuss science effectively.

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1. Introduction

The nature of TikTok has evolved over the years, moving away from its initial orientation based exclusively on humour. Users have discovered that this ecosystem also allows the opening of new communicative discourses focused on the expansion of culture and knowledge (Sánchez-Castillo and Mercado-Sáez, 2021; Jaramillo-Dent et al., 2022; Guiñez-Cabrera and Mansilla-Obando, 2022). TikTok defines itself as a company whose mission is to capture and present creativity, knowledge and the most important moments of life (Rodríguez-Hernández, 2022). In this sense, the platform hosts a variety of profiles that form online communities where subscribers can learn, ask questions and discuss the different branches that make up science (Zeng, et al., 2021; López et al., 2024).

Science, engineering, health, social and legal sciences have all found a place on TikTok thanks to the audiovisual creations of hundreds of individual and specialised channels. This dynamic of production and consumption acts as a catalyst in the scientific field, providing a platform for the dissemination of the various disciplines that make up science. Content as diverse as mathematics, chemistry, geography, history, psychology, language, computer science and biology are gaining significant reach in terms of engagement (Radin and Light, 2022; Micaletto-Belda, et al., 2024).

The language of the platform, its algorithm, the dynamic plots and the variety of visual resources that members can include in their audiovisual narratives have contributed significantly to the success of this social network. These communicative codes, sometimes characterised by entertainment and humour, contribute to the positive reception of messages (Becerra-Chauca and Taype-Rondan, 2020; Martínez-Sanz, et al., 2023).

The discrepancy between the language of classical science and the language of common knowledge has traditionally been one of the most persistent barriers to the advancement of science in society. In the case of TikTok, prosumers have adopted the language of the platform itself. This translates into the proliferation of short videos specifically designed for smartphones, which have been key to advancing science, influencing different audiences and promoting a deep amalgamation of messages for educational purposes (Collie and Wilson-Barnao, 2020; Sidorenko-Bautista, et al., 2021; Muñoz-Gallego, et al., 2023; Cristófol-Rodríguez and Carrasco-Santos, 2023; Aguilar-Mera, et al, 2023, Muñoz-Gallego et al, 2024; Vizcaíno-Verdú, 2024). These factors have contributed positively to science reaching several generations of users. Thus, not only centenarians have found an environment based on participation and digital interaction (Muñoz-Gallego and Jiménez de las Heras, 2021; Blanco and González, 2021).

Historically, bringing scientific activity closer to society, especially to young people, has been and continues to be a universal objective within conventional educational paradigms. However, such an endeavour has experienced shortcomings and limitations, characterised by monotonous transmission and approaches that could currently be considered inadequate from a methodological point of view (Prensky, 2015; Martín-Ramallal and Merchán-Murillo, 2019; Martín-Ramallal et al., 2022a, Martín-Ramallal et al., 2022b and Santaolalla-Camino, 2022).

Therefore, the exploration of new methods and communication trends to disseminate scientific knowledge and stimulate the interest of audiences emerges as an imperative goal to identify good practices and ways to connect with different people who, for different reasons, have not been able to benefit from epistemological knowledge (Castelfranchi and Polino, 2021; Martin-Neira, et al., 2023).

This research aims to analyse the production methods and content strategies used by different TikTok science disseminators. Under this premise, a study is carried out on the evaluations of these prosumers on the dynamics they use in the production of their videos. The aim of this study is to improve the adaptation and approach of scientific content disseminated on this social network, by showing the guidelines used by TikTok science communicators to achieve reach and success in their publications. Thus, the social interest of this dissertation, within the field of Communication Studies, lies in improving and enhancing the ways in which science is broadcast on this social network, with the ultimate goal of showing mechanisms that may be relevant for creators of scientific content.

The subject is related to the Sustainable Development Goals (SDGs), which are part of the 2030 Agenda. Specifically, it focuses on SDG 4 (education), SDG 5 (gender equality) and SDG 10 (reducing inequalities). This relationship stems from the need to understand and improve the ways in which science is communicated in TikTok, which can contribute to improving people's education. Likewise,

education, combined with global access to science, is an inexhaustible source of progress. Therefore, facilitating its dissemination on the network is a fundamental practice to reduce social inequalities.

It is also worth mentioning that the Survey of Social Perception of Science and Technology (2022), carried out by the Spanish Foundation for Science and Technology, shows that there are significant gender differences in terms of interest in science. Therefore, studying the methods of producing scientific content is a necessary task in order to improve its approach and reduce the endemic gap that exists between men and women in social networks such as TikTok and Instagram (Gil-Ibáñez, et al., 2022).

In light of the above, the following questions are posed in the study What production dynamics are used by the creators of scientific content on TikTok? What aspects of the platform facilitate the dissemination of science? What is the educational level of these prosumers?

1.1. Science Content Strategies in TikTok

This concept refers to a detailed plan developed by an institution, company or individual to effectively create, publish and manage content on any of the many channels an organisation may have. In the case of TikTok, content creators seek to generate impact and visibility, encourage participation and, above all, build a solid and consolidated image that contributes to the brand's reputation (Gil and Guallar, 2023).

This task necessarily implies that the creators of scientific content on the platform have to study different key parameters in order to achieve success. Therefore, scientific prosumers need to know the answers to the following questions What is the best time to publish? How important is it to convey messages in the language and tone of the social network? What is the value of creativity and the way science is approached? What are the current scientific trends? What kind of videos are most interesting for the audience? These factors are fundamental to creating content that will have an impact on users. In addition, it is necessary to understand the role played by elements such as the share button, the community, the editing tools, SEO (materialised in the profile description, hashtags, username, etc.) or the complex algorithm in TikTok (Martínez, 2021; Pretel-Jiménez, et al., 2024; Jacobson, et al., 2020).

Taken together, all these elements make it possible to generate engagement with a given audience. This means that the channel acquires an important level of participation through the analysis of some indicators, such as the number of likes, comments, shared posts and time spent (Rissoan, 2016; Martínez, 2021; Barreto and Rivera-Prado, 2022).

2. Research objectives

The research has two objectives:

a) Determine the dynamics and content creation strategies of TikTok's science prosumers.
b) Identify the aspects that are part of the natural language of the platform that facilitate the dissemination of science through the ecosystem.

3. Methodology

3.1. Methodology and Study Approach

The stated objectives will be achieved through an inductive and quantitative approach (Reyes-Blácido et al., 2022). This means that the study examines the evaluations of a group of creators of scientific content on TikTok, with the aim of generating a theory about the optimal strategies that contribute to the diffusion of science in this ecosystem. A first observation is that scientific prosumers have adopted the codes and natural language of the platform, generating a unique form of communication and cultural expression for talking about science that is worthy of study.

This scientific article aims to describe and deepen this reality. According to Bernal-Torres (2016), this research is about faithfully representing the particularities of a specific phenomenon, as it captures the context in which information circulates in a specific ecosystem. The materialisation of

this dissertation requires prior documentary research, which is why it is necessary to locate and evaluate the information available through the publication of texts written in indexed journals, which are key to obtaining a complete vision of the state of the art of this collaborative phenomenon (Gil-Quintana, 2023).

3.2. Quantitative Study

The paper includes the development of a survey based on a semi-structured questionnaire. This type of research allows an in-depth exploration of a specific social reality through empirical data. In general, quantitative approaches aim to collect, quantify and examine a set of data (Hernández-Sampieri, et al., 2018). This was done by means of an online questionnaire of our own design, which served as a basis for collecting the opinions of a group of people on the aforementioned subject.

This form consists of three main sections: dynamics and strategies for producing scientific content on TikTok, elements of the platform that facilitate the dissemination of science, and participant data.

It consists mainly of Likert-type questions, rated from 1 to 4, with the following values 1 is not at all, 2 is a little, 3 is quite a lot and 4 is a lot. There are also single, multiple and open-ended questions. Aspects such as nationality, political affiliation or marital status were not considered relevant to the defined objectives. However, variables such as education, age and gender of the prosumers were taken into account, as it is understood that these factors may influence the participants' impressions. The data collected was transferred to a spreadsheet in order to represent this reality in numerical form.

The items that make up the form were designed after viewing 200 videos on the platform that deal with scientific content. On the other hand, the works presented by Castro-Martínez and Díaz-Morilla (2021) and López-Fernández (2022) also contributed to its development.

3.3. Questionnaire Validation and Fieldwork

The questionnaire was reviewed by three researchers with extensive experience in developing quantitative studies. They were provided with a validation document that outlined the purpose and aims of the research. This included a table of different items to enable these experts to assess the suitability of the form.

The opinions expressed by the participants were positive. They ranged between 4 and 5 points. The participants responded positively to the questions. 100% felt that the questionnaire was adequate to achieve its objectives. However, two relevant objections were raised: a) It was pointed out that the form contained a high number of items. b) It was recommended to include an introductory text at the beginning. These changes were made, resulting in the final form used in the research.

3.4. Participant Profile and Sample Justification

The individuals who participated in this dissertation have a channel related to the dissemination of science. Therefore, it is considered that these individuals meet the necessary criteria to achieve the objectives of the study. These profiles were identified using the hashtag #cienciaentiktok, which had more than 143.4 million views at the time of the research. This hashtag has become particularly popular among science content creators on the platform to promote their science videos, compared to others such as #ciencia (14 million) or #cienciaytecnologia (16 million), which have had less impact. Therefore, this hashtag was chosen based on the impact generated by this content.

A spreadsheet of the selected profiles was created. In this selection process, the publications of these channels were previously observed in order to determine whether they met the necessary requirements to be included in the database. These are spaces that publish, with a certain frequency, videos on at least one of the different branches of knowledge that make up science. At this stage, 334 different profiles were identified. Individual private messages were sent to these users. As a result of this work, 36 replies were obtained.

As a critical assessment, the sample obtained is considered to be very small. This is due to the difficulty of getting these prosumers to fill in the form. It is true that it is not possible to determine the exact reasons for the low response rate, but the number of questions in the form, as well as the possible mistrust that may exist when receiving a message from an unknown person, may have contributed to an increase in the refusal rate.

Despite these limitations, the data obtained are of great interest because they show the patterns used by these content creators to disseminate science, which is essential for people's education (Rodríguez-Rivas, 2023).

3.5. Time Frame

The scientific study was carried out according to a methodological protocol divided into four distinct phases. The first phase was the problem formulation phase. In this phase, the subject of the study was defined, the research objectives were defined, the relevant state of the art was reviewed and the relevant research questions were posed. These activities were carried out between September and October 2002.

The second focuses on the methodological proposal and preliminary observation. Here, the methodological part of the study was developed, defining the techniques and procedures to be used. The database of profiles consulted between 16 and 17 October 2023 was also created.

The third phase corresponds to the fieldwork, which was carried out over an extended period of five months in total: October, November and December 2023 and January and February 2024. During this period, information will be systematically collected.

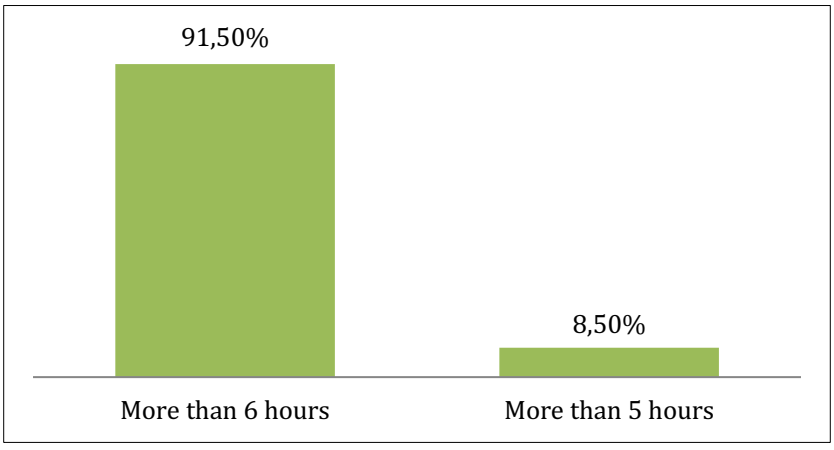
Finally, the fourth phase of the study consists of analysing the results and drawing conclusions. These activities were carried out between February and March 2024.

4. Results

The analysis of the 36 responses to the form shows the following results.

It can be seen that most content creators spend more than 6 hours preparing to publish science videos on TikTok (91.5%). The remaining percentage (8.5%) represents users who spend more than 5 hours (See graph 1). These data show the time spent on preparing videos on this topic, which in many cases are not very long (Suárez-Álvarez and García-Jiménez, 2021). Also, their effort and dedication to researching scientific issues and transferring science to this environment.

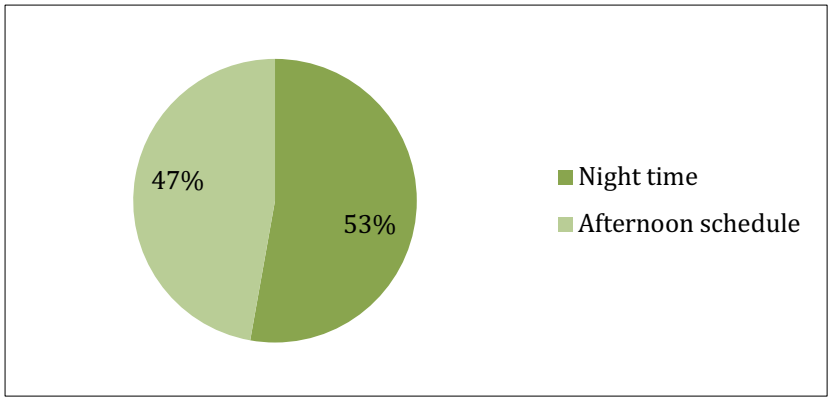
Graph 1. Hours of dedication



Source: Own elaboration

On the other hand, there are two determined positions on the most appropriate time to publish videos (See graph 2). 52.8% prefer to do so in the afternoon (12:00 - 19:00), while 47.2% prefer to broadcast content at night (20:00 - 12:00). Hernando-Illán (31 July 2023) points out that the optimal time of publication depends on the characteristics of each audience. This means that there can sometimes be contradictory analyses, depending on the sources consulted. For this reason, each content creator should take the time to study the interaction periods of their target audience. These tend to be times when the user is not engaged in a relevant activity, such as working or studying. This may partly explain why the morning and early morning hours did not receive a positive response.

Graph 2. Publication schedule



Source: Own elaboration

Regarding the performance of creativity in TikTok, all participants agree that it is of great importance, represented by the combination of responses 3 (41.75%) and 4 (58.3%). Furthermore, these prosumers emphasise the imperative need to adapt scientific expression to the linguistic format inherent to the platform in order to improve the reach of the content, as this is a crucial factor for the effective promotion of scientific dissemination (Alonso-López and Sidorenko-Bautista, 2022).

The prevalence of the humorous tone, with a percentage of 94.4%, and the informative tone, reaching 91.7%, are the predominant codes used by content creators on TikTok when dealing with scientific topics. On the other hand, the neutral tone, with 8.3%, or the serious tone, with 5.6%, hardly find a place on the platform. This phenomenon is evidence of the assimilation by these content creators of the dominant communicative elements in the aforementioned digital ecosystem.

On the other hand, the fields of knowledge that these content creators subscribe to are Natural and Exact Sciences (47.2%), Health Sciences (25%), Social and Legal Sciences (19.4%) and Arts and Humanities (11.1%). This is in line with the study presented by Micaletto-Belda, et al. (2024), which points out that these are the scientific fields that are most represented in TikTok.

A variety of video typologies can be observed among these prosumers (see table 1), including explanations of scientific concepts (52.8%), news (47.2%), tutorials (44.4%), curiosities (36.1%), research articles (30.6%), experiments (27.8%), challenges (13.9%), collaborations (2.8%), and competitions (2.8%). It is worth noting that creators in the Natural and Exact Sciences show a remarkable innovation by including all these categories in their productions. In the Social Sciences, videos mainly focus on presenting news, concepts and curiosities, a trend shared by creators focusing on health issues. Finally, there is less variety in the arts and humanities, where videos are limited to tutorials.

Table 1. Type of videos and level of use

Video type	Usage percentage
Scientific concepts	52,8%
News	47,2%
Tutorials	44,4%
Curiosities	36,1%
Research articles	30,6%
Experiments	27,8%
Challenges	13,9%
Collaborations	2,8%
Competitions	2,8%

Fuente: Elaboración propia

There are several elements that, according to respondents, facilitate the spread of science through this platform.

TikTok's algorithm is a key part of how science reaches users. 75% of respondents ticked option 4 (a lot) and 22.2% ticked option 3 (quite a lot). Only 2.8% chose option 1 (not at all). Cusot-Cerda and Palacios-Arias (2021) note that TikTok's algorithm allows videos to be shown to thousands of users, regardless of whether they are subscribed to the channel. In addition, it quickly and accurately identifies the tastes of its members, contributing to the dissemination of science. However, this is also a limitation. As Wang and Guo (2023) point out, TikTok uses artificial intelligence systems to personalise the user experience by presenting content that is likely to be of interest to the user in order to create an addiction. This sophisticated preference system causes users to live in a filter bubble, restricting their access to other content. As a result, users live in a restricted environment.

Sections such as comments and community (97.3%), editing tools (94.2%), interface (93.4%), trends (91.2%), hashtags (94.5%), viral capacity (90.1%), music (86.4%), visual effects (83.7%), live (81.9%) or the possibility of including complementary resources (40.3%) also stand out favourably. Some of these data are in line with the study presented by Velarde-Camaqui et al. (2024), who conclude that the number of hashtags used in science videos, the language used and the audiovisual resources implemented allow these prosumers to engage.

On the other hand, the capacity of the network to generate recall is limited. This factor therefore represents an obstacle to the dissemination of science from the perspective of these prosumers. The short audiovisual format, while capable of attracting the attention of a wide audience, does not have the power to generate medium-term recall in all recipients. However, not all participants were of the same opinion. 8.3% (4) and 19.4% (3) were positive about TikTok's potential to achieve this goal. The number of interactions, the type of content and the audiovisual resources used in the edition can influence this aspect.

In this ecosystem, information circulates in an entertainment environment. This was assessed differently by the respondents. 55.5%, adding the percentages of responses 3 and 4, believe that the fact that science is presented in an entertaining environment facilitates its dissemination. On the other hand, 44.5% disagree with this premise.

As far as education is concerned, all the scientists who participated in the study have some kind of academic qualification. 36.1% have a bachelor's degree, 25% a master's degree and 16.7% a doctorate. This means that 77.8% have a university education. On the other hand, the rest of these prosumers (19.4%) have a bachelor’s degree or equivalent.

In terms of gender, 77.8% of the prosumers are men and 22.2% are women. These data show that there is a certain inequality among the participants in the study. However, it is important to stress that we have worked with a specific sample, which has conditioned these results.

5. Conclusions

After analysing the data provided in the study, the following research questions are answered What production dynamics do science content creators use in TikTok? What aspects of the platform facilitate the dissemination of science? What is the educational level of these prosumers?

Most of the participants spend a considerable amount of time, more than six hours, on the production of their audiovisual productions. This partly reflects the process of planning, execution and dissemination implicit in these productions. It also shows that evenings and nights are the most suitable times for publishing scientific videos.

The importance of different elements for the effective dissemination of scientific knowledge in TikTok is highlighted. These include the algorithm, visual effects, the use of editing tools and hashtags. Importantly, participants emphasise the need to adapt scientific expression to the linguistic format inherent in TikTok. This finding suggests that adapting to the communicative style characteristic of the platform is essential to increase the reach and effectiveness of scientific dissemination. On the other hand, the humorous tone, represented by a remarkable 94.4%, and the informative tone, with 91.7%, constitute the dominant communicative codes among content creators to address scientific topics.

The most popular video formats among these prosumers are about scientific concepts, news, tutorials, experiments or curiosities. Different types of publications stand out in the different scientific fields, with the natural and exact sciences having the largest amalgamation of publications.

From the point of view of these content creators, prosumers interested in setting up such a channel should acquire the necessary knowledge to manage these elements of the platform, as they can significantly influence the success of their videos.

In terms of education, all the scientific creators who participated in the study have some kind of academic qualification. 36.1% have a bachelor's degree, 25% a master's degree and 16.7% a doctorate. This means that 77.8% have a university education. On the other hand, the rest of these prosumers (19.4%) have a bachelor's degree or equivalent.

One aspect that limits the development of science on the platform is the difficulty of generating medium-term recall. TikTok videos circulate massively and in a short period of time a user may have watched dozens of videos on different topics. In addition, scientific content can sometimes be mixed with content of no cultural value (Micaletto-Belda, 2022). Therefore, while it is true that this space creates an entertaining context for the dissemination of knowledge, the environment of excitement also means that content of such importance is not given the attention it deserves.

As a limitation of the research, it is necessary to highlight that we have worked with a specific sample made up of a small group of scientific content creators. Despite the number of profiles identified (334) and messages sent, the number of responses received was low (36). This factor has limited the results of the study. However, given the growing interest in social networks as a link for the transmission of scientific knowledge, the study is appropriate to continue exploring methods of production and publication that contribute to the expansion of science in the Internet galaxy.

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