

# Scientific communication after the COVID-19 crisis: TikTok publishing strategies on the transmedia board

Comunicación científica tras la crisis del COVID-19: estrategias de publicación en TikTok en el tablero transmedia

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## ABSTRACT

**Introduction:** This research aims to show the vision of prominent journalists regarding the adaptation of science journalism to digital contexts. In addition, it addresses the possibilities offered by this web ecosystem to use transmedia narratives and TikTok as platforms for dissemination. **Methodology:** The methodology applied included semi-structured interviews with professionals linked to institutions, media, and university researchers in the area of Communication. **Results:** The study demonstrates the opportunity that the transmedia environment represents for science journalism as an ally to bring knowledge closer to new audiences. On a practical level, they point out its graphic potential, access, and immediacy, in addition to proposing recommendations on content, style, and relationship with

the users of the messages that are disseminated in TikTok. **Discussion:** The research also includes a critical sense of the need for professionals and the media to adapt to new environments as a vital factor for sustainability. Understanding that it is not a question of passing trends but of the challenge of recovering the confidence of audiences and guaranteeing their viability. **Conclusions:** In addition to reporting rigorously on topics of interest at a critical moment of misinformation, it must aspire to create communities around science and generate attractive content for audiences not accustomed to this information. Avoiding a replicating use of social networks, taking advantage of all their narrative possibilities, and, ultimately, contributing to reinforcing the value of the professional practice in a context of media discrediting.

**Keywords:** Transmedia storytelling; TikTok; Digital journalism; Science journalism; Scientific communication; Social media; COVID-19.

## RESUMEN

**Introducción:** La presente investigación analiza la visión de destacados periodistas y comunicadores sobre la adaptación del periodismo científico al entorno digital: por un lado, se abordan las posibilidades del ecosistema web para el uso de las narrativas transmedia y, por otro, se explora el potencial de TikTok como plataforma divulgativa. **Metodología:** El trabajo incluye un corpus de entrevistas semiestructuradas a profesionales vinculados a instituciones y medios junto a investigadores del área de Comunicación. **Resultados:** El estudio evidencia la oportunidad que supone para el periodismo científico el entorno transmedia como aliado para acercar el conocimiento a nuevos públicos. A nivel práctico, apuntan sus potencialidades gráficas, de acceso e inmediatez, además de proponer recomendaciones sobre contenidos, estilo y relación con los usuarios de los mensajes que se divulgan en TikTok. **Discusión:** La investigación también conlleva un sentido crítico ante la necesidad de que profesionales y medios se adapten a los nuevos entornos como un factor vital de sostenibilidad. Entendiendo que no se trata de tendencias pasajeras sino del reto de recuperar la confianza de las audiencias y garantizar su viabilidad. **Conclusiones:** Además de informar con rigor sobre temas de interés en un momento crítico de infodemia, se debe aspirar a crear comunidades en torno a la ciencia y generar contenidos atractivos para públicos no habituados a estas informaciones. Evitando un uso replicante de las redes sociales, aprovechando todas sus posibilidades narrativas y, en última instancia, contribuyendo a reforzar el valor del ejercicio profesional en un contexto de desprestigio mediático.

**Palabras clave:** Narrativas transmedia; TikTok; Periodismo digital; Periodismo científico; Comunicación científica; Redes sociales; COVID-19.

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

## 1. Introduction

The Coronavirus pandemic has highlighted the importance of scientific communication in everyday life (Fürst, 2021), but it has also led to a crucial moment to rethink how scientific actions are being communicated and how this message can better reach the public (Diviu-Miñarro and Cortiñas-Rovira, 2020). Indeed, traditional media are no longer the only possible way to transmit scientific messages. Thus, the strengthening of digital native media -those created directly on the Internet and not derived from other printed or audiovisual traditional media-, and their expansion through social networks, has allowed barriers to be broken and emerging, participatory, interactive, playful, or visual formats to be experimented with (Harmatyi, 2021; León, 2021). These distinctive features can be attributed to genres such as transmedia narratives, that is, stories that, by using their interactive elements, linking and creation by users, can facilitate the social appropriation of scientific knowledge (Jauregui and Ortega, 2020). Moreover, when linked to social networks, these narratives are likely to be transformed

into an important vehicle for transmedial scientific communication (Picó et al., 2018). It is in this context that the social network TikTok appears, an app that already exceeds more than 1 billion users worldwide (Statista, 2021) and that every day is becoming more and more a favorite for young people, especially for those born between 1996 and 2010, Generation Z (Cervi, 2021). Its short videos, with a high power of viralization and interaction and created by the users themselves (Martín and Micaletto, 2021), make it an interesting network for the convergence of transmedia elements and new paths for science communication.

The main objective of this research is to analyze the current use of transmedia narratives to communicate science on TikTok and to identify strategies to optimize their application. Furthermore, it aims to establish which are the necessary elements for an adequate publication on these platforms. Finally, it seeks to determine which communication strategies via TikTok are the most appropriate to attract the audience belonging to Generation Z.

The applied methodology includes the semi-structured interviews technique, directed at prominent academics and professionals in the area of communication and journalism who, as detailed below, have been selected given their experience and knowledge in the field of research and the exercise of their profession. The analysis of their contributions and opinions has allowed us to identify opportunities and propose the design of scientific dissemination strategies –that apply transmedia narratives and incorporate the use of emerging formats– in a social network such as TikTok, which has experienced a boom since the beginning of the COVID-19 pandemic.

We consider that both the topic and the methodology respond to the research concerns that the current media board requires, connected to the sustainability of the media itself and the challenges of new platforms. This is the case of TikTok which, far from being a fad of the youngest, is unleashing strategic changes in other platforms such as Instagram, Facebook, and YouTube (Pellicer, 2022) affecting both the business model and the narratives. There are already media outlets such as *The Guardian* (Milmo, 2022) that also note that it has ceased to be an exclusive network for young people to become the preferred one for an increasingly larger population.

In this case, the focus is on scientific journalism as a reflection of what may be presented as the Achilles Heel of the current media system: misinformation, lack of trust of new audiences, and the need to place rigorous and quality information in the foreground. We also believe that promoting the use of transmedia invites the public to be part of this creation of information and, in this way, increases the collaborative possibilities in scientific content. These are all challenges that we place in the context of booming scientific journalism, as one of the lines of development and specialization that are marking the profession and the readaptation of the media in the current post-COVID stage (Cerezo, 2021), but which are completely exportable and generalizable to the reality of the practice of journalism in the new digital board.

### **1.1. Scientific journalism and the digital environment**

As a discipline, scientific journalism combines the creativity of reporting with the intellectual desire to teach about science. It's a profession that blends research, analysis, and communication techniques (Pearson, 2017), and that, somehow, gives unaccustomed audiences a glimpse of what is happening in the scientific world (Autzen, 2014).

In this context and after the explosion of the Internet, an interactive communication channel between scientists and users has been generated (López-Pérez and Olvera-Lobo, 2016) in which scientific journalism has found ways to transmit information in a diverse, pluralistic way and using different

channels (Fahy and Nisbet, 2011). Even professionals themselves have been able to experience how this discipline has been declining in their traditional communication channels and how alternative models for its transmission have had to emerge (Cortiñas-Rovira et al., 2015).

Indeed, the various apps and platforms that have emerged on the Internet are currently one of the media's main bets to attract audiences interested in scientific content (Harmatiy, 2021). This challenge has led to the fact that, especially journalists working in this area, have to improve their writing skills, adapting as much as possible to the language of each medium, thus trying to adequately disseminate specialized information (Calvo-Rubio and Ufarte-Ruiz, 2021). In this way, the digital environment has opened the doors so that journalists can communicate in different ways with their audiences (Dunwoody, 2015), generating narrative constructions in which both can participate, as Olvera-Lobo and López-Pérez point out (2015) when highlighting that the Web has transformed scientific journalism concerning the participation of the public in the verification of information. Fahy and Nisbet (2011) also report other benefits of digital scientific journalism, citing values such as the plurality of the obtained information, the new interactive ways to communicate science, and the existence of journalists with critical, summarizing, and information analysis skills.

But not everything is positive. There are also significant challenges and issues for communication professionals working on these digital platforms. Maiden et al. (2020) state that, to communicate science effectively to diverse audiences, a large number of journalists need a greater volume of resources and digital information when developing news stories. Furthermore, Kristiansen et al. (2016), in their study about journalists in Switzerland, note that most communicators don't have enough time to produce, collect, write, and verify the pieces. A similar situation occurs with that observed by Cassany et al. (2018) since they state that science journalists need to write at length, "but they cannot do in-depth research and, ultimately, cannot rigorously fulfill their informative function" (p. 16).

However, from the premise that time will pass and science communication will continue to be a fundamental discipline for the processes of social, economic, and cultural transformation (De Semir and Revuelta, 2010), it is essential to know the opportunities that are envisioned for its development, as well as to exploit the consumption habits that audiences are deploying in their access to the Internet (Sanz-Lorente and Guardiola-Wanden-Berghe, 2019).

## **1.2. Transmedia narratives: new allies of scientific journalism**

Transmedia narratives can be defined as a story that is transmitted in multiple media and platforms, and that has audiences that, besides consuming the product, are part of the generation of new creative pieces (Scolari, 2014). Such constructions pursue that any story or product can be expanded through all kinds of platforms. Moreover, they must be able to be created and developed both in large corporations and in a teenager's bedroom (Jenkins, 2010). In this sense, Costa-Sánchez and López-García (2021, p. 239) highlight the benefits of this type of narrative by pointing out: *i*) that their use adds great depth to the stories, allowing greater exploration of the narrative universes; *ii*) they value the diversity of platforms that exist to access the stories and that these contents can be "enjoyed" without overlapping each other; *iii*) finally, they highlight the central role given to audiences and receivers, since, through their active participation, they can influence the structures of the stories.

Transmedia journalism uses these elements and brings them together in a myriad of experiences that can be audiovisual, interactive, or mobile (Renó and Flores, 2018). Thus, with more or less success, there are increasingly more media and journalists adapting to these technologies, taking advantage of the available channels that can be exploited by these types of narratives (Calvo-Rubio and Serrano-Tellería, 2021). This favors the emergence of social journalism based on the visual aspect (Trillo-

Domínguez et al., 2019). In fact, the term *slow journalism* is often used to refer to this transmedia journalism since the news coverage, data processing, and the design proposed to display the contents require more planning (Costa-Sánchez et al., 2019).

Progressively, transmedia storytelling is beginning to play an important role in the current communication process, a space that, despite being subject to continuous changes and alterations in its productions, takes advantage of the multiplicity of networks and platforms that exist today to transmit information (Alberich-Pascual and Gómez-Pérez, 2017). In this way, transmedia storytelling has positioned itself as an interesting way for the media to produce news and as a tool that can be effective in bringing the population closer and involving them in the creation of scientific knowledge (Chomón-Serna and Busto-Salinas, 2018). Precisely, experiences associated with journalism and transmedia-based scientific communication have become a viable alternative for users to be part of these narrative universes and contribute to the dissemination of science content (Villegas Carmona, 2020). For example, the multimedia and interactivity offered by these types of narratives have been valued positively in the world of scientific documentaries, which has favored their expansion (Christin, 2018).

There has also been a good relationship between transmedia and multi-platforms in science museums. It's in these places where the public, besides contemplating the physical exhibits, can enjoy other contents associated with them, which are accessed through web apps linked to the exhibits (Tabares-Robales, 2021). Other positive examples are provided by podcasts as a means of scientific dissemination to connect with audiences (De-Lara-González and Del-Campo-Cañizares, 2018) or the use of transmedia narrative to facilitate communication of the problem of glacier melting and climate change, through art exhibitions, *YouTube* videos, or the use of *Google Earth* (Lam and Tegelberg, 2019). Beyond these examples, where transmedia has been mostly used as an informative channel has been in social networks since, due to their possibilities of viralization and immediacy, they have an important power to disseminate and communicate the initiatives that are generated (Gürel and Tıǧlı, 2014).

### 1.3. TikTok: much more than just a dance

Undoubtedly, transmedia narratives find in social networks an ideal medium to generate interactive communities, with active audiences that facilitate participation and collaboration (Atarama-Rojas and Requena Zapata, 2018; Giraldo-Luque et al., 2020). Generally, young people are the main users of these types of tools, as receivers but also as content creators (De La Fuente-Prieto et al., 2019). But, in particular, it is Generation Z that has adopted social networks and smartphones as an essential part of their lives (Alonso-López and Terol-Bolinches, 2020). And it is in this age spectrum - people currently between 12 and 26 years old - that a social network has gained followers, especially in times of pandemic, to communicate and transmit messages (Tamara-Quiroz, 2020). As can be assumed, we refer to TikTok, an app created in China aimed at teenagers, based on the production of short videos (Kaye et al., 2021) and where it has been possible to successfully massify the creation of audiovisual productions of its own users, which mix the use of various filters, background music, or humor (Omar and Dequan, 2020). In this way, it is understood that TikTok is projected as a transmedia narrative because most of the content is created by the users or fandom (Vásquez González, 2021), at the same time that young people receive positively all the audiovisual stimuli promoted by this type of platforms (López-Pérez, 2021). Ultimately, this social network is created to break boundaries and spread stories to various places in the world (Triwidyati and Pangastuti, 2021).

The field of journalism has observed with interest the communicative power of the platform and has already begun to generate experiences in this app. Thus, traditional media such as *The Washington Post* (Sidorenko-Bautista et al., 2021) or, in the Spanish case, television media such as Antena 3, RTVE, or Canal Sur (Vázquez-Herrero et al., 2021) already have profiles to share what they do daily. This is how

news platforms have found in this social network a new way to communicate with audiences, either by showing the "behind the scenes" of the news, small fragments of interviews, or news, all of them using the popular elements of the app, such as texts, transitions, filters, and in funny, simple, short, and positive tones (Vázquez-Herrero et al., 2020; Sidorenko-Bautista et al., 2020).

Science communication has also welcomed the possibilities offered by this network to disseminate knowledge, especially in times of pandemic. Simultaneously, the same platform has developed initiatives aimed at raising awareness about aspects of COVID-19 (TikTok, 2020). Furthermore, several studies and experts have evaluated the positive use of these videos, which develop all the characteristics of the app and seek to educate the population with videos that invite them to disinfect themselves properly, prevent the disease, or even as therapy in times of confinement (Ostrovsky and Chen, 2020; Becerra-Chauca and Taype-Rondan, 2020; Li et al., 2021; Biondi-Situmorang, 2021).

But it is not only about the rise of TikTok during the pandemic. There are also outstanding experiences in science communication at the level of climate change (Hautea et al., 2021), by promoting scientific knowledge through chemical experiments (Habibi and Salim, 2021), or by providing information on diabetes (Kong et al., 2021). An opportunity is at hand, which is evident when considering, for example, that the "science" hashtag is popular among users, manages to generate high interactions (Yamine, 2020), and is widely used in the app (Martin-Neira et al., 2022).

However, despite the evolution experienced and the numerous possibilities offered by this platform, the reality is that currently the use of TikTok for scientific dissemination and the potential that transmedia narratives can offer there are not sufficiently identified or developed from the perspective of academic research. This is the starting point of this research.

## 2. Objectives

For the development of this study, a qualitative methodology has been applied based on the creation of a corpus of semi-structured interviews with leading experts in digital journalism, with both academic and professional profiles. The use of this technique aims to know the vision of these specialists on the development of science journalism in the digital environment, as well as the recommendations they propose on the use of TikTok to communicate science and on the use of elements that respond to transmedia narratives. The confluence of experts with a double profile, researcher and professional, is considered a key aspect of this type of work and a fundamental contribution to this research.

## 3. Methodology

The study combines profiles of professional journalists, media system consultants, university researchers, and experts in the field of communication. The sample is made up of specialists linked to the geographical area of Spain, where the development of works in this field has played a very prominent role in recent years and has even been placed at the top best in the world (Trabadela-Robles et al., 2020; Trillo-Domínguez and De-Moya-Anegón, 2022). In this way, the aim is to build a Spanish perspective on the way science is currently communicated, which can also constitute a starting point for future studies referring to other geographical contexts and different journalistic markets.

A judging sampling process was used to select the interviewees. Thus, deliberate, critical, or judging sampling is a non-probabilistic sampling technique in which the study units are selected according to the conceptual criteria defined by the research team, establishing the most important characteristics that delimit their structure (Mejía Navarrete, 2000). This technique offers the advantage of allowing a qualitative diagnosis to be obtained. As indicated, the sample was limited to specialists born or working

in Spain and, at the same time, meet one of the following criteria: *i*) researchers or academics who are authors of papers published in the last 5 years on digital journalism, transmedia narratives, social networks, or science journalism and who have, as of June 2022, a *Google Scholar Citations* h-index equal to or greater than 10 *ii*) researchers or academics who are authors of papers published in the last 2 years about the TikTok platform as a communication tool *iii*) professionals with more than 5 years of work experience in the area of digital, science, or transmedia journalism, working in the private sector, media, institutions, or press offices. Additionally, efforts have been made to maintain gender equity and to have a broad representation from various Spanish universities and institutions.

### 3.1. Response collection and analysis

Following the proposed objectives, semi-structured interviews were chosen due to their greater flexibility since they allow adapting to the interviewees while clarifications and terms or concepts that have not been well developed can be addressed (Díaz-Bravo et al., 2013). To carry out the interviews, 55 potential participants in the study were contacted –via email, social networks, websites, or telephone– all of whom had a proven academic or professional profile and met the previously established criteria. Each of them was asked to be part of the research. 60% of the contacted people were linked to the academic-university world and 40% were professionals from the media, institutional offices, or consultants from private organizations. On the other hand, 58% of those contacted were men and 42% were women, in an attempt to seek greater equity among the participants. A week later, a reminder was sent to those who had not yet responded. After this, 10 people openly stated their inability to participate in the study, and from 23 there was no feedback or the interviews could not be carried out.

Finally, 22 specialists were recruited for the research (Table 1). These interviews were conducted in a virtual format and recorded with the prior consent of the participants. However, some, due to the availability requirements of the interviewees themselves, were conducted by telephone or e-mail and, when necessary, doubts could be clarified through that medium. The contents to be covered in the conversations were previously anticipated by the research team to situate the interviewees and provide an appropriate context for them to express their opinions. The recorded interviews had an average duration of 27 minutes and were conducted during March and April 2022. Table 1 shows the sample of participants interviewed, as well as their professional affiliations.

**Table 1.** *Characterization of the participants in the interviews*

Description of interviewees (in alphabetical order)	
<b>Cristina Aced:</b> Specialist in digital communication with more than 15 years of experience as an independent communication consultant. Author of the book «Nuevas narrativas digitales».	<b>Miquel Pellicer:</b> Director of Digital Communication, Universitat Oberta de Catalunya. Specialist in digital communication, both in media and organizations. Author of books on the subject.
<b>Jordi Alberich-Pascual:</b> Academic and researcher, Universidad de Granada. He is the author of articles on journalism and transmedia narratives. H index=17.	<b>Simón Peña-Fernández:</b> Academic and researcher, Universidad del País Vasco. He is the author of articles on social networks and digital journalism. H index=16.
<b>Marga Cabrera:</b> Academic and researcher, Universitat Politècnica de Valencia. She is the author of articles on journalism and digital communication. H index=10.	<b>César Peña Martínez:</b> Journalist at RTVE's Audiovisual Innovation Laboratory. Communication professional specialized in new narratives, with extensive experience in current affairs.
<b>Luis Mauricio Calvo:</b> Academic and researcher, Universidad Castilla de la Mancha. He is the author of articles on journalism and transmedia stories. H index=10.	<b>Eduardo Prádanos:</b> Founder and Creative Director of FLUOR Lifestyle. He founded the Asociación Innovación Audiovisual and created the transmedia comic '100 crises of a first-time dad'. Professor in several institutions.

**Patricia de Casas Moreno:** Academic and researcher, Universidad de Extremadura. She is the author of articles on social networks and new media. H index=12.

**Daniel Resnich:** Co-founder and transmedia Creative Producer at Goodmoment. Professor and Specialist in Transmedia Storytelling to connect with new audiences.

**Jesús Miguel Flores-Vivar:** Academic and researcher, Universidad Complutense. He is the author of articles on scientific journalism and digital journalism. H index=12.

**Ramón Salaverría:** Academic and researcher, Universidad de Navarra. He is the author of articles on digital journalism and is in the Spanish top 25 with the highest scientific production in communication (Trillo and De-Moya, 2022). H index=47.

**Manuel Gertrudix:** Academic and researcher, Universidad Rey Juan Carlos. He is the author of articles on scientific communication. H index=22.

**Pavel Sidorenko Bautista:** Academic and researcher, Universidad Internacional de La Rioja. In the last 2 years, he has authored articles on the use of TikTok as a communication tool.

**Bienvenido León:** Academic and researcher, Universidad de Navarra. He is the author of articles on science communication and digital journalism. H index=21.

**Jorge Vázquez-Herrero:** Academic and researcher, Universidad Santiago de Compostela. He is the author of articles on transmedia, and social networks, and is in the Spanish top 25 with the highest scientific production in communication (Trillo and De-Moya, 2022). H index=12.

**Rosalba Mancinas-Chávez:** Academic and researcher, Universidad de Sevilla. She is the author of articles on scientific journalism and the use of new media. H index=14.

**Mario Vidal:** Head of innovation for the digital newspaper El Español. Journalist specialized in social networks, audience development, user experience, and team management.

**Pablo Martín-Ramallal:** Academic and researcher, Centro Universitario San Isidoro. In the last 2 years, he has authored articles on the use of TikTok as a communication tool.

**Arantxa Vizcaíno-Verdú:** Predoctoral Researcher, Universidad de Huelva. In the last 2 years, she has authored articles on the use of TikTok as a communication tool.

**Elena Neira:** Independent consultant, member of the GAME research group-Universitat Oberta de Catalunya. Specialized in new audiovisual distribution models.

**Mariano Zafra:** Editor-in-chief of visual narratives at El País. Specialist in visual journalism. Former editor of the infographics and visualization team at Univisión Noticias, among other media.

**Source:** Own elaboration.

Taking as a reference the study on the perception and training of Chilean journalism by Vernal-Vilicic et al. (2019) and to expedite the processing of the statements and maintain the anonymity of the person who issued them, the presentation of the results is coded following the *In* format (where *I* refers to interviewee and *n* is an order number randomly assigned by the researchers). The qualitative analysis of the semi-structured interviews conducted with the experts was carried out with *NVivo* software (Lopezosa, 2020) and the contents were grouped into 8 coded sections, associated with the initial questions of the questionnaire that served as the basis for the development of the semi-structured interviews (Table 2). For data analysis, a word frequency query was performed on each coding created, utilizing word generalizations and thus locating key concepts issued by the specialists. A simple text query was also performed on phrases made by the interviewees, generating *word trees* (Trigueros-Cervantes et al., 2018) that helped to visualize the answers. Considering these two processes, the information presented in this study was ordered and grouped.

**Table 2.** Basic questions for the semi-structured interviews

Category	Questions
Identification of interviewees	-Consents to be part of the study, to record the interview, and to use the answers anonymously: Yes/No -Name -Gender -Place of work -Age -Level of education



General information: scientific journalism in the digital environment

Use of social networks (TikTok) as a means to communicate science with transmedia development.

- 1) How do you think scientific journalism is adapting to the new digital environment?
- 2) In the case of scientific journalism, what is the importance of communicating differently depending on the type of media and dissemination platform?
- 3) Do you consider social networks as a means of dissemination for scientific journalism or do they still simply act as a loudspeaker for the cybermedia?
- 4) The coronavirus pandemic changed the ways we communicate, what should scientific journalism pay attention to in the digital environment?
- 5) What are the benefits of generating transmedia stories for science journalism?
- 6) Is TikTok a suitable network for transmedia storytelling and what transmedia elements have been applied?
- 7) How can we maintain the balance between entertainment and dissemination in this social network?
- 8) What strategies should be used to conquer the TikTok audience and what should we pay attention to in order to not experience difficulties when communicating science?

**Source:** Own elaboration.

#### 4. Results

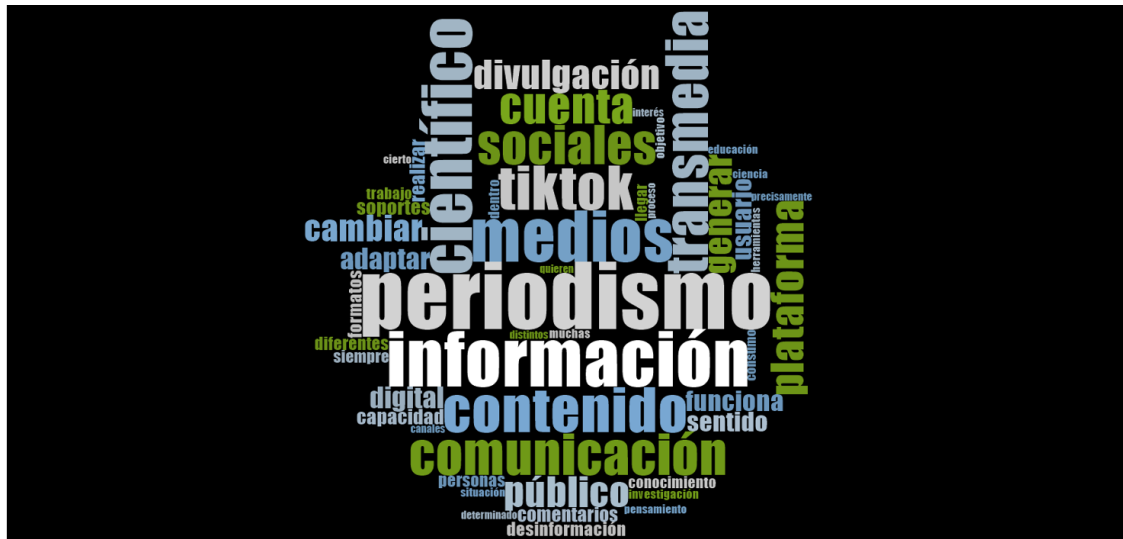
The concepts that appear most frequently after the general analysis of the corpus of interviews (Figure 1) show that specialists associate scientific journalism in the digital ecosystem with the concepts of information, content, social networks, audience, and platforms, elements that are somehow key when evaluating how the discipline adapts in this context.

On a more specific level, when asked about *how scientific journalism is adapting to the digital environment*, a mixture of answers is obtained regarding this question. Several interviewees (I.7, I.8, and I.9) warn that scientific journalism "has had no choice but to adapt" and "has had no choice but to do so", so these changes have had to be accelerated "in an unplanned way". Moreover, one of the respondents (I.10) openly states that "journalism is late to the transformations". However, there is a positive vision in this process and it is the valuation they make (I.11, I.12, I.17) to the "use of social networks" as a channel for dissemination and to bring knowledge closer to the community.

When asked about *what science journalism should pay attention to as normality returns after the pandemic*, the interviewees (I.3, I.4, I.8), in general, emphasize that the criteria of "effectiveness" should continue to be reinforced, "rigorousness in the face of misinformation", and continue "the

process of digitalization" that has been taking place in recent years, promoting the emergence of more and more "specialized media, with audiovisual sense and with a focus on the community" (I.18). Moreover, it is believed that since the health crisis, users see the discipline with different eyes, since (I.8) "now we have realized (that) (science journalism) is of vital importance".

**Figure 1:** *Most frequent concepts in responses to interview questions*



Source: Own elaboration.

There is no total certainty on the part of the interviewees that social networks are a medium or that they continue to be a loudspeaker for the cybermedia. For some (I.5), the benefit of social networks is that "they give relevance to information that is not common, that is not part of the agenda-setting" and this can strengthen them as a platform, and that, for this reason, (I.6) "social networks have become a means of dissemination of the different thematic areas of science" and even (I.15), "today social networks are a medium in themselves, a generator of content, and a generator of languages". On the other hand, some specialists still believe that there is still a little more to be done to consider them as media and that the contents generated in central supports, such as a website or traditional media, continue to be replicated. (I.1) believes them to be "more appropriate as a loudspeaker or complementary element, than as an ideal mean of communication", being for some (I.7) "a tool for dissemination, for extending communication and for attracting visitors to a page". All the interviewees state that communicating according to the codes of each platform should always be attempted and that replicating the contents should not be abused, but many times ideal information is not achieved, either (I.2) "because the languages used for the messages are not correct" or because (I.8) "not all the media has the capabilities or resources".

There is also a generalized approval by the interviewees as to whether transmedia narratives can be beneficial for communicating science and technology stories. Interactivity and the relationship obtained with users, together with the possibility of expanding and adapting the story, were the main concepts obtained in the analysis. The specialists (I.3) value "participation, since it is one of the pillars of communication, and this is achieved very well with transmedia stories", as well as highlighting (I.19) that these actions are "a great opportunity to connect with audiences" and that, additionally (I.22), "thanks to this transmediality, we can choose the best way to tell the story". The reasons for this positive adaptation could be that science journalism (I.2) "fits relatively easily in any channel because it does not



of this platform. The following phrases from the interviewees are taken as an example to reinforce this analysis:

I.15: "You have to observe how they communicate and then use that communication to align yourself with that style, which you cannot try to impose".

I.21: "Trying to see with our old or *boomers'* eyes the way of expressing themselves and understanding the world of, for example, Generation Z, doesn't usually go well".

I.13: "I need to understand the expectations and motivation of this target".

I.14: "(It is beneficial) everything that involves interviews, asking the public, getting opinions, doing duets, in other words, everything that involves more people".

The other point focuses on the publications' content, looking closely at the trends presented by the platform, either with music or through the main parodies. It is also suggested to make short videos that attract attention in the first seconds, make an impact, are visual, and use the main graphic elements offered by this social network. The main phrases of the interviewees are highlighted to account for this point of view:

I.19: "The essential thing is to learn the codes of each platform, in this case, TikTok, to be able to apply them in content generation".

I.20: "Brevity and impact work very well, along with being visually clear".

I.8: "It has to be something very effective at the beginning, a message, an image, something very eye-catching that captures attention".

I.16: "The more creative you are when presenting the content, whether with the image, the voiceover, the narrative you have decided on for that format, the more likely it is that the video will work".

Finally, taking the opinions and proposals of the specialists as a reference, a summary table is included (Table 3) with the recommendations that can be extracted from the conducted interviews. These basic orientations or guidelines can contribute to facilitating the generation of publications on TikTok that are beneficial for communicating science. These recommendations are organized around aspects associated with the user community – user profiles or the relationship with audiences–, others related to technical issues –which are directly related to how videos are presented–, and those linked to content elements –which focus more on the substance of the message–.

**Table 3.** *Basic recommendations for using TikTok in science communication.*

Recommendations with the community	Technical and video style recommendations	Message content recommendations
<p>Include in the user's biography other links to social networks and thus encourage communication with followers.</p>	<p>Always create a script and <i>storytelling</i> of what is going to be done, with opening, development, and closing.</p>	<p>Make videos with informative and brief scientific "pills", as these are well received by the user. It is not optimal to make videos on long scientific topics.</p>
<p>Listen to followers and respond to the comments they generate. It is important to understand the motivations of the audience.</p>	<p>Training on how to use these tools is recommended. It is ideal to be trained in these technologies.</p>	<p>Bring science closer through elements of everyday life. And that, at the same time, can leave a teaching.</p>

Encourage the community to participate and generate content, expand the story through this or other platforms, and promote transmediality.	Making videos with chroma, where an image is superimposed, works well and engages the audience.	Along with the rigor of science, include content with features close to entertainment, humor, and fun.
Post videos at times when your audience is most active. And, on the other hand, if a video doesn't go viral the first time, try again after a few weeks. Don't be afraid to recycle content.	It is advisable to make an agile edition, with quick cuts and eye-catching visual elements.	Try to be creative, not only with the images but also with the generated voice-over. Always maintaining journalistic rigor.
Always be clear about the content or trends that are driving the network, both in terms of challenges and music.	Create short videos that unite emotion and initial impact. The first 5 seconds are key to retaining the audience.	Grab attention by generating "how-to" videos: The step-by-step of an infographic, the B-side of a scientist's interview, or how sources are searched.
Speak in the language of this social network and the code of young people. Avoid technical terms when interacting with them.	When making a video, use a protagonist, a visible face that generates sympathy and closeness to the followers.	Offer space for videos with experimentation, so that the audience can apply them at home, and interaction is encouraged.

**Source:** Own elaboration.

## 5. Discussion and conclusions

More and more media and journalists are using digital networks as the main tool for communicating science to the community (López-Duque and Tejedor, 2020). For this reason, it is necessary to keep updating the knowledge and actions developed in this ecosystem. The present study shows that this adaptation to the digital world is still consolidating. In fact, for many journalists, the adaptation to cybermedia or social networks has been an obligation given by their proliferation, rather than by a desire to participate in them. Because of this, it becomes evident what Marta-Lazo et al. (2020) stated about how essential it is to reinforce in professionals "the basic elements of journalism and technological training" (p. 63) to, in this way, make the approach to this type of developments more harmonious.

From this premise, we consider it key to take advantage of all the digitization opportunities that have arisen in newsrooms and with communication professionals due to COVID-19, since the pandemic reinforced the value of explanatory and service journalism, with the consequent need to have specialists who could adequately deal with this type of information (Calvo-Rubio and Ufarte-Ruiz, 2021) and under this type of technologies. The journalists surveyed for this research warn that the future challenges of science journalism are directly related to improving "the digitization process". In particular, and as has already been highlighted on numerous occasions (Aleixandre-Benavent et al., 2020; Salaverría et al., 2020; Pérez-Escoda and Pedrero-Esteban, 2021), it is necessary to be "rigorous in the face of misinformation". Thus, it is essential for journalists to be alert to fake news and to be able to offer reliable information. This is one of the great tasks that science journalism has and will have in the coming years and a challenge for the practice of the profession.

Another area that science journalism will have to pay attention to is the use of social networks, apps increasingly adopted by communication professionals (Mellado and Hermida, 2021) and positioned

as prominent platforms for communicating science to the community (Davies et al., 2021). Thus, although traditional media continue to "dominate the dynamics of production and circulation of information" (Matassi et al., 2020, p. 11), the possibility of reaching a wide variety of audiences with the amplification of a message generated in social networks makes it attractive to use them and master their codes. Even though some of the participants in this study still consider social networks as a loudspeaker of the cybermedia, replicators of content that only bring traffic to the web, recent research points to a more autonomous function of social networks, which would go beyond serving as a link to the websites of newspapers (Parra Valcarce and Onieva Mallero, 2021) and that would connect with a truly transmedia communication. Such reality would justify the clear need to increasingly value the potential that can be achieved with this type of networks (advancing in their use beyond their usefulness to get traffic to a news portal or the abuse of "*clickbait*"), properly managing the codes that these apps have and thus adapting the messages according to the characteristics of these networks. In this way, reliable communication channels can be created that deliver reliable information to users (Ulpo et al., 2020) without the need to link to a web portal.

The use of social networks as a transmedia channel that contributes to expanding the stories to other platforms is presented as a positive tool for viralization, immediacy, and the creation of content and communities (Renó and Flores, 2018). It should be remembered that networks are one more medium within the range of supports that the narrative universe has to disseminate stories. However, their global penetration, and the possibilities they provide to interact and exchange opinions among users (Calleja-Reina et al., 2018; Calcanéo-Monts, 2021), position them appropriately and open new opportunities to transmit scientific information.

So far, several transmedia experiences have been documented that effectively use social networks to reach more audiences (Chomón-Serna and Busto-Salinas, 2018; Celaya et al., 2020; Kippes, 2021). For this reason, it is interesting to delve deeper into their impact and possibilities in the context of scientific content. To optimize their use in this area, however, such messages will have to adapt their formats to this multimedia, hypertextual, and interactive environment. Furthermore, these types of stories will have to break the linear concept of communication and offer the news not only as information but also as an experience for users (Trillo-Domínguez and Alberich-Pascual, 2020). This way, in line with the opinions of the specialists participating in this study, it is easier to generate community and encourage audiences, by being heard and having tools for participation to produce new spaces to tell a story.

Since it has been shown that digital media can facilitate visual, interactive, and transmedia production (Mena-Young, 2022), TikTok, with the characteristics it presents, stands as a key platform to inform, breaking the classic molds of communication, making it participatory, and using all the tools that currently transform it into one of the most consumed social networks by young people (Zeng et al., 2021; Peña-Fernández et al., 2022). In this regard, the experts who have been part of this study value the possibilities offered by this network and the benefits that can be achieved to bring scientific content closer to its users. To this end, they stress the idea that it is essential to produce short videos that impact the user. Indeed, the first few seconds are the most important when it comes to catching the attention of the user and offering the content (Kaye et al., 2021; Wang, 2021).

On the other hand, like previous studies (Chobanyan and Nikolskaya, 2021; Martín-Ramallal and Micaletto-Belda, 2021), this analysis shows that to adequately reach audiences, it is extremely useful to use the graphic tools offered by the platform, organize challenges with the followers, create videos with post-production effects, or include musical trends that are visually attractive.

Additionally, as mentioned above, it is important to promote the creation of communities when creating messages on this type of platform. This means being willing to listen to users, read their comments,

and accept their suggestions. TikTok favors this type of group environment, promoting interactivity among its members and communication in different directions (Suárez-Álvarez and García-Jiménez, 2021). The fact that young people are the main users of this network (Cervi, 2021) does not mean that it is used only as an exclusively recreational app, where dances or parodies of fashionable viral content are recorded. On the contrary, more and more experiences of effective science communication are being added, especially after the coronavirus pandemic (Basch et al., 2021; Biondi-Situmorang, 2021; Southwick et al., 2021). However, there is a need for further analysis and application of such platforms that are oriented to audiences not necessarily very accustomed to scientific content.

It is important, on the other hand, to reflect on the role that journalists and the media should have when using social networks as information platforms. We cannot forget the responsibility to the audiences and being guarantors that the scientific information transmitted is truthful, explanatory, and contributes to the scientific literacy of society. All this, recognizing the new languages and ways of communicating that audiences and these social platforms have, something that is often not achieved, perpetuating styles that do not go hand in hand with the current times, where interactivity and appropriation of the visual and digital are fundamental.

Likewise, although the research focuses on scientific journalism, a field of specialization that is booming both academically and professionally, the contributions made are perfectly exportable to the context of the practice of journalism at a time of maximum uncertainty and forced adaptation to the challenges posed by digital culture (Orihuela, 2021). What is at stake is the role that professional journalism (traditional media and journalists vs. new platforms and content creators) will play in the processes of communication, debate generation, and creation of public opinion in new democracies (Cerezo, 2022).

In the future, further research should analyze how the use of TikTok, as a tool for scientific dissemination and popularization, continues to evolve. In this sense, it will be possible to measure to what extent the recommendations already made by the specialists interviewed to improve how publications are made on this platform begin to be put into practice. Also, it will be interesting to know the opinion of experts from different parts of the world, including other issues and questions, as well as to apply other complementary methods of data collection and processing to broaden the knowledge of the opinions and experiences of specialists in this field. All of this will continue to contribute to optimizing the use of social networks and transmedia narratives to communicate science and technology.

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