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University Faculty's Media Competencies and Science Outreach: A Systematic Review of the use of Social Media and its Alignment with the 2030 Agenda

Competencias mediáticas del profesorado universitario y divulgación científica: una revisión sistemática sobre el uso de las redes sociales y su alineación con la Agenda 2030

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Abstract

This article presents a systematic review of scientific outreach through digital social networks in the context of higher education, with particular focus on the media competencies of university lecturers and their connection to the Sustainable Development Goals (SDGs). Following the PRISMA protocol, 46 studies published between 2010 and 2025 were analysed, drawn from the WoS, Scopus, and Dialnet databases, in Spanish, English, and Portuguese. The findings reveal notable methodological diversity—including qualitative, quantitative, mixed, and theoretical approaches—as well as a thematic focus on platforms such as Twitter, Facebook, Instagram, YouTube, and TikTok. The review confirms that these networks serve not only a communicative role but also function as strategic tools for university social responsibility, particularly in relation to SDGs 4 (quality education), 9 (industry, innovation, and infrastructure), 16 (peace, justice, and strong institutions), and 17 (partnerships for the goals). Additionally, media competencies, as defined by Ferrés and Piscitelli (2012) and the Digital Competence Framework for Teachers 2.2 (INTEF, 2022), are identified as essential components to be incorporated into both initial and ongoing teacher training, fostering ethical, critical, and inclusive science communication. The study concludes that science outreach via social networks constitutes a strategic avenue to strengthen universities' commitment to sustainability, human rights, and the democratization of knowledge.

Keywords: science outreach; university; social media; media literacy; sustainability; communicative competence.

Resumen

Este artículo presenta una revisión sistemática sobre la divulgación científica a través de redes sociales digitales en el contexto de la educación superior, con especial atención a las competencias mediáticas del profesorado universitario y su vinculación con los Objetivos de Desarrollo Sostenible (ODS). Siguiendo el protocolo PRISMA, se analizaron 46 estudios publicados entre 2010 y 2025, extraídos de las bases de datos WoS, Scopus y Dialnet, en español, inglés y portugués. Los resultados evidencian una notable diversidad metodológica —incluyendo enfoques cualitativos, cuantitativos, mixtos y teóricos—, así como un enfoque temático en plataformas como Twitter, Facebook, Instagram, YouTube y TikTok. La revisión confirma que estas redes no solo cumplen una función comunicativa, sino que también operan como herramientas estratégicas de responsabilidad social universitaria, especialmente en relación con los ODS 4 (educación de calidad), 9 (industria, innovación e infraestructura), 16 (paz, justicia e instituciones sólidas) y 17 (alianzas para lograr los objetivos). Asimismo, se identifican las competencias mediáticas —según el modelo de Ferrés y Piscitelli (2012) y el Marco de Competencia Digital Docente 2.2 (INTEF, 2022)— como componentes esenciales que deben incorporarse tanto en la formación inicial como en la continua del profesorado, promoviendo una comunicación científica ética, crítica e inclusiva. El estudio concluye que la divulgación científica mediante redes sociales constituye una vía estratégica para reforzar el compromiso universitario con la sostenibilidad, los derechos humanos y la democratización del conocimiento.

Palabras clave: divulgación científica; universidad; redes sociales; alfabetización mediática; sostenibilidad; competencia comunicativa.

1. Introduction

Science outreach in digital social networks (DSN) is an interdisciplinary object of study that brings together frameworks of public science communication, media literacy, educational technology, open science, digital competence in teaching and the Sustainable Development Goals (SDGs).

Science outreach is to be understood as a set of practices aimed at translating, adapting and disseminating scientific knowledge to non-specialised audiences, using accessible codes, understandable narratives and culturally meaningful formats (Castaños, 2017). It aims at fostering scientific culture, promoting critical thinking and facilitating citizen participation in public debates on science and technology. In DSNs, these practices acquire new dynamics by being integrated into open, interactive and far-reaching platforms such as Twitter/X, Instagram, YouTube, Facebook or TikTok (Gil & Guallar, 2023; Marchal *et al*., 2025).

In the field of higher education, science outreach is part of the so-called "third mission" of universities, along with teaching and research. Its importance lies in its capacity to enhance the visibility of institutional scientific output, foster knowledge transfer, and strengthen the connection between universities and society (Vásquez-Rocca, 2024). It also represents a pedagogical tool to support student learning, contributing to the development of scientific literacy and communication skills. Despite this, the participation of university teaching staff in DSN for dissemination purposes is usually a voluntary activity, neither compulsory nor formally recognised in academic evaluation systems. This situation poses a tension between the social value of science outreach and its scarce institutional recognition, which does not invalidate its transformative potential or the ethical commitment it entails (Ataide Malcher *et al*., 2025).

DSNs are open spaces for the exchange and dissemination of content that promote science outreach among wide-ranging and diverse audiences. However, they also pose relevant challenges, such as the adaptation of academic language to short and visual formats, the maintenance of scientific rigour in the face of the tendency towards media spectacularisation, and the need to address the risks associated with misinformation (Moreno *et al*., 2024; Saiz & Nieto, 2021).

From the perspective of scientific communication in digital environments, communication is mediated by algorithms, aesthetics, immediacy and the engagement of the digital ecosystem (Bucchi & Trench, 2021). In this sense, the media literacy model proposed by Ferrés & Piscitelli (2012) offers an ideal framework for analysing science outreach practices in social media. This model articulates six dimensions - language, technology, interaction processes, production and dissemination, ideology and values, and aesthetics - that allow us to assess the media competence of transmitters and receivers. Applied to the university context, this framework makes it possible to examine the argumentative quality, communicative clarity, ethical positioning and aesthetic impact of the scientific messages disseminated by the faculty.

In terms of competencies, it is key to consider the UNESCO ICT Competence Framework for Teachers (UNESCO, 2018), the Digital Competence Framework for Educators, DigCompEdu (Redecker, 2017) and its derivative for Spanish teachers: the Digital Competence Framework for Teachers (INTEF, 2022). These instruments establish levels of progression in areas such as information literacy, digital communication and collaboration, content creation, data protection and problem solving. Furthermore, the open science paradigm provides a structural framework for understanding the relevance

of science outreach as part of a more democratic and collaborative model of knowledge production and circulation. Open science promotes open access to publications, data transparency, inter-institutional collaboration and citizen participation in the scientific process (UNESCO, 2021), goals that are facilitated, but also strained, by the strategic use of DSNs.

In this theoretical framework, it is essential to integrate the perspective of the SDGs (Navarro-González & Gavari-Starkie, 2024), given that science outreach in DSNs is directly aligned with SDG 4 (quality education), especially in its target 4.7, and also contributes to SDG 9 (innovation), SDG 10 (reducing inequalities) and SDG 16 (strong institutions). These practices not only democratise access to knowledge and foster educational innovation, but also strengthen public trust in science and institutions. From this perspective, university science outreach is analysed as a strategic dimension of social transformation, thus articulating the critical framework that guides this systematic review.

1.1. Review of previous studies on science outreach in DSNs

The traditional one-way communication model, focused on mass media and print media, has been progressively displaced by interactive, horizontal and transmedia approaches that characterise platforms such as Twitter/X, (Kloppmann-Lambert & Carter-Thomas, 2024), Instagram (Almeida & Moreno-Rodríguez, 2024, YouTube (Ataide Malcher *et al*., 2025) or TikTok (Martin-Neira *et al*., 2023).

Several systematic reviews have approached this phenomenon from different methodologies, allowing us to identify common trends, turning points and research gaps. Among these most relevant works are reviews (Ataide Malcher *et al*., 2025; Martin-Neira *et al*., 2023) focused on the role of DSNs in science journalism and public communication of science, respectively. They highlight the rise of health and environmental issues, and underline the growing role of social platforms as channels of interaction with new audiences. Both coincide in pointing out the lack of training of professionals to adapt content to visual and interactive formats and the need to adapt messages to the communicative logic of each network, encouraging participation and interactivity.

On the other hand, Occa *et al*. (2024) introduce an innovative perspective by analysing the use of memes in public health campaigns. They reveal the potential of these formats to capture attention and stimulate engagement, especially in young audiences, although they also point out the limited theoretical underpinning and limited impact evaluation of the studies analysed. Complementarily, Powell & Pring (2024) address the impact of influencers on health outcomes, concluding that they can have positive or negative effects depending on the type of content, reinforcing the need for critical and evidence-based communication within the digital ecosystem.

From an educational perspective, Gil-Fernández & Calderón-Garrido (2021) identify the potential of DSNs as a didactic resource and as a means to strengthen teachers' digital competence. This line reinforces how the type of content shared by teachers on Twitter/X influences the perception of credibility and motivation of university students. In turn, (Saiz & Nieto (2021), from the field of scientific communication in health, also highlight the use of Twitter/X as a channel for disseminating information on cancer, demonstrating its effectiveness in the dissemination of verified information.

Likewise, Soto *et al*. (2024) explore the impact of the COVID-19 pandemic on scientific communication, highlighting phenomena such as the proliferation of preprints, disinformation and infodemics. Although they do not focus exclusively on DSNs, their

findings show the consolidation of these platforms as channels for rapid and open scientific dissemination.

In summary, these reviews highlight a series of regularities: (1) the transition towards participatory and interactive formats; (2) the concern for scientific credibility; and (3) the need to develop media skills in researchers and communicators.

Although interest in science outreach in DSN has grown in recent years, previous systematic reviews present relevant limitations, such as the scarce integration of media and digital competence frameworks (Ferrés & Piscitelli, 2012; INTEF, 2022) and the weak connection between these practices and the SDGs. Furthermore, there is still a lack of studies proposing training guidelines for university teachers or assessing their impact on higher education. Given these gaps, this study conducts a systematic review that integrates the critical analysis of media competences, DSNs and university commitment to sustainability, critical citizenship and human rights within the framework of the 2030 Agenda. Consequently, the need for a critical analysis that articulates scientific dissemination, media literacy and sustainability is raised.

1.2. Aim and research questions

The overall objective of this study is to conduct a systematic review of the literature to analyse how science popularisation practices in DSNs, promoted by higher education, contribute to sustainability, the formation of critical citizenship and the integration of teaching media competences oriented towards the SDGs.

In line with this purpose, the following research questions were posed:

- What approaches and methodologies predominate in university science outreach research in DSNs, and how do they contribute to understanding the social role of the university?
- Which DSNs are most frequently used by university faculty to disseminate science and generate equitable access to knowledge?
- What recommendations are derived for the training of university faculty in the strategic and ethical use of DSNs as a tool for dissemination committed to human rights and sustainability?
- What SDGs do these digital science outreach practices contribute to and what implications do they have for university social responsibility?

In this context, it is crucial to analyse the role of higher education in promoting science outreach practices that favour social sustainability, critical citizenship and respect for human rights, in line with the principles of the 2030 Agenda. This study is part of the reflection on universities as strategic agents of social transformation, contributing directly to the debate on their responsibility in education for sustainable development and the defence of human rights.

2. Methodology

This article adopts a documentary research approach. The review was conducted following the PRISMA protocol (Urrútia & Bonfill, 2010) complemented with the updated methodological recommendations for its application (Moher *et al.*, 2016).

2.1. Validity threat criteria

To ensure internal validity, studies were analysed using a protocol that involved the following metadata: title, keywords, type of research, methodology, results and discussion and analysis of conclusions. For external validity, studies that do not argue their results were discarded. And, for the validity of the conclusion, the quality assessment criteria (Lockwood *et al*., 2015) and the guidelines for transparency and replicability (Díaz-Iso *et al*., 2020) were applied.

2.2. Selection procedure and inclusion and exclusion criteria

The study selection procedure was governed by inclusion and exclusion criteria. We included articles published between 2010 and February 2025, indexed in the Web of Science (WoS), Scopus and Dialnet databases, which explicitly addressed scientific dissemination in DSN in the context of education. Only peer-reviewed research written in English, Portuguese or Spanish was considered. As for the exclusion criteria, studies that did not respond to the objective or the research questions were discarded, as well as those that corresponded to other types of academic documents (conference proceedings, books, chapters or editorials). The bibliographic manager Mendeley was used to identify and eliminate duplicate studies.

2.3. Search strategy

The search was carried out in the databases Dialnet, Scopus, and Web of Science (WoS), using Boolean combinations (AND/OR) with the key terms: *science outreach*, *education*, *teachers*, and *social media*. Equivalent terms such as *science communication*, *science dissemination*, *promotion of scientific knowledge*, *open science in digital environments*, and *online academic outreach* were also considered to broaden the spectrum of results. The search string used, in both Spanish and English, was:

KEY (science communication OR science outreach OR science dissemination OR academic outreach) AND (social networks OR digital social networks)

In Scopus, results were filtered by the area of Social Sciences; in WoS, by the Science Citation Index Expanded (SCI-EXPANDED), Social Sciences Citation Index (SSCI), Arts & Humanities Citation Index (A&HCI), and Emerging Sources Citation Index (ESCI), allowing us to refine the thematic relevance of the selected studies.

For the purposes of this review, *digital social networks* (DSNs) and *social media* are used interchangeably, as both terms appear in the literature and were necessary to include in the search strategy to avoid excluding relevant studies. The term *platforms* is used selectively when referring to the technological tool or environment that hosts a DSN, or as a contextual synonym to avoid unnecessary repetition of the DSN abbreviation within the same sentence.

2.4. Quality criteria

To reduce potential bias, each study was assessed independently by three researchers, assigning a score from 1 to 5 according to previously defined criteria. The aspects assessed included the argumentative strength of the results, the explicit focus on science outreach through DSNs and the differentiation with respect to studies focused on the educational use of these platforms. The analysis matrix included key metadata such as authorship, year of publication, main discipline, educational level addressed, type

of study, associated SDGs and DSNs analysed. Inter-rater consistency was verified by Cohen's Kappa coefficient (k = 0.835), with an agreement level of 97 %, indicating high reliability (Tang *et al.*, 2015).

2.5. Data analysis and visualisation

As a complement to the qualitative analysis, we used VOSviewer software to visualise thematic clusters through keyword co-occurrence maps, which allowed us to identify semantic relationships and emerging trends in university science outreach in DSNs. In parallel, we employed ATLAS.ti for systematic coding of the documents, organising citations around DSNs, SDGs, and study types. The assignment of SDGs to each study was carried out by the researchers through in-depth textual analysis of the articles. This process considered both explicit mentions and implicit connections inferred from the study's objectives, content, and outcomes. Based on this coding, we constructed co-occurrence tables and Sankey diagrams to represent the flows between the digital platforms, the SDGs addressed, and the methodological approaches employed, thus providing an integrated view of the research dynamics. The visualisations generated include semantic network maps and multi-stage flow diagrams, supporting a relational interpretation of the analysed corpus.

2.6. PRISMA protocol flow

The PRISMA protocol finally selected 46 studies that met the selection criteria (Figure 1).

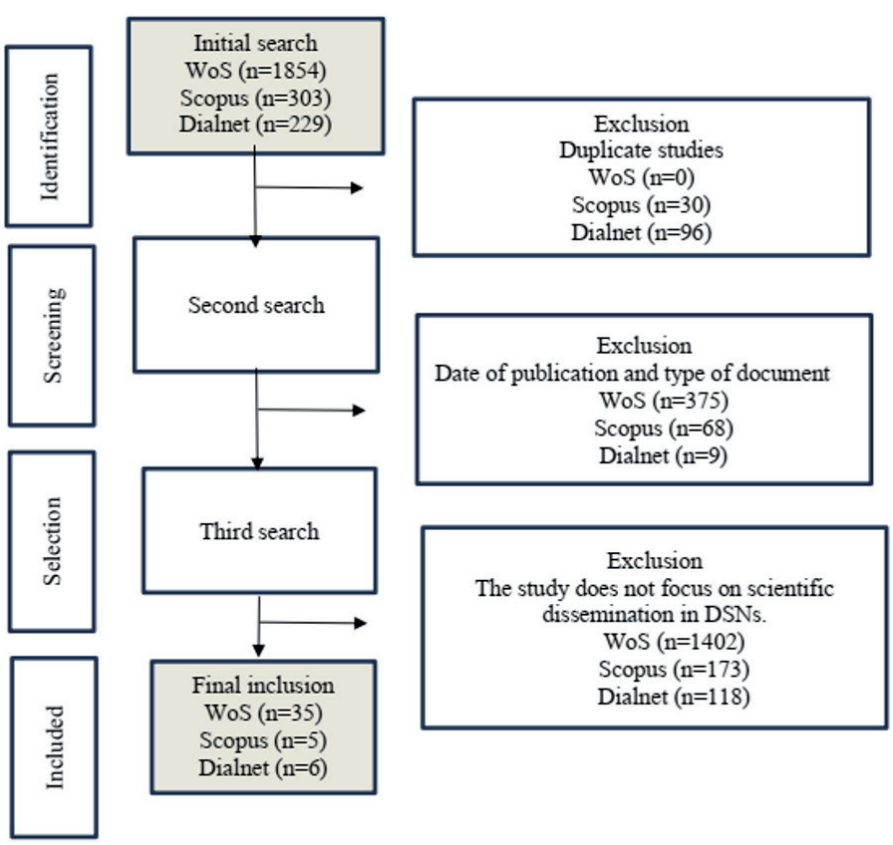

Figure 1. Figure of the process carried out. PRISMA protocol.

3. Results

The analysis of the 46 selected studies reveals a growing evolution in the academic interest in scientific dissemination in DSNs. Between 2010 and 2019, scattered and more exploratory contributions are identified, with a reduced number of annual publications. However, from 2020 onwards, a sustained and significant increase is observed, with significant peaks in 2022 (15 studies), 2023 (19 studies) and especially 2024 (28 studies). This pattern suggests a consolidation of the field as a priority object of study, coinciding with the expansion of open access, post-pandemic university digitisation and the growing demand for social responsibility from academia. The temporal cut-off of the review in February 2025 reinforces the topicality of the object of study analysed.

When visualising the networks of author keywords, 169 terms are identified (Figure 2) represented by 14 clusters, of which only 18 have a minimum of two concurrences between them, being the most representative (Figure 3).

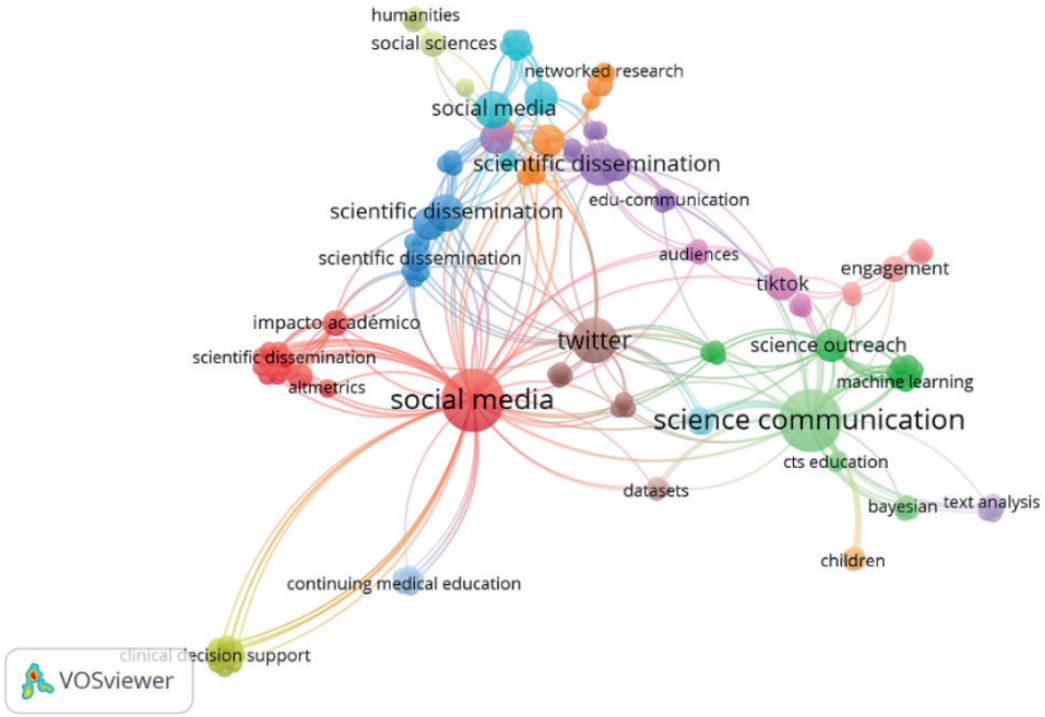

Figure 2. Keyword clusters.

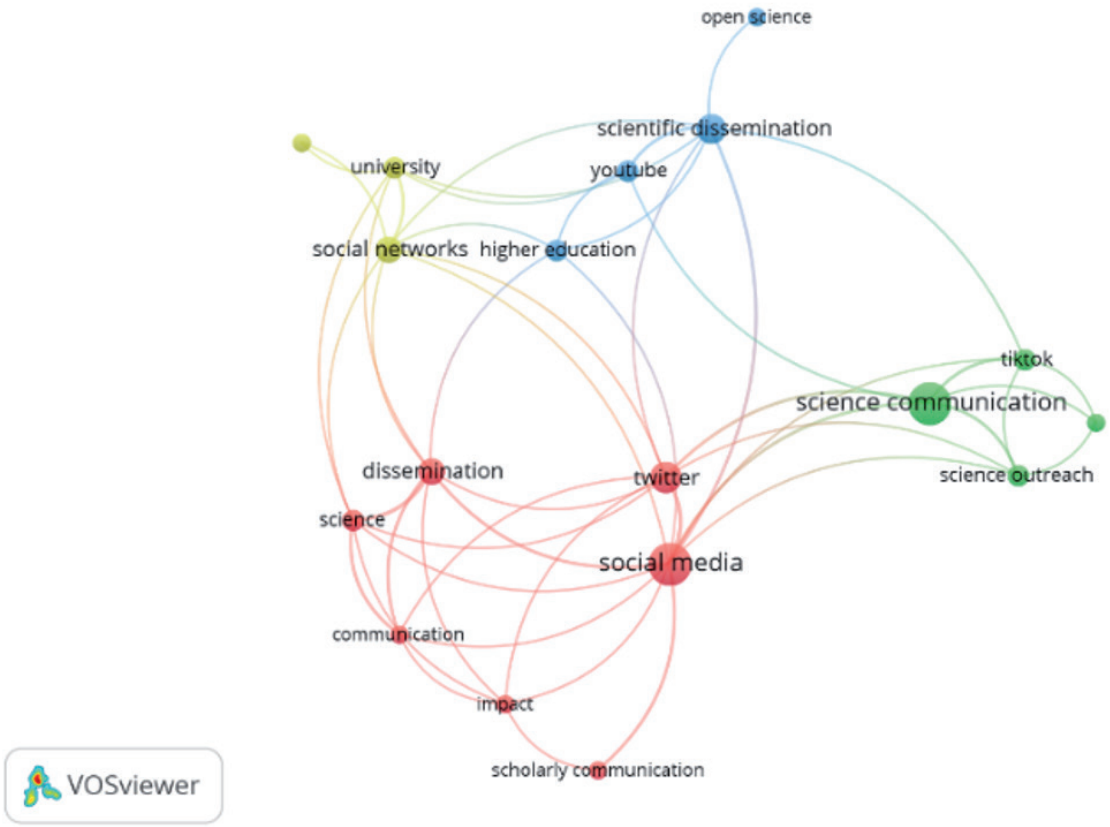

Figure 3. Main keyword clusters.

The analysis of the semantic networks made it possible to identify four main clusters (Figure 4), which reflect the most recurrent thematic areas in the studies analysed:

- Cluster 1: *Communication, dissemination, impact, scholarly communication, science, social media, Twitter*. This cluster articulates the fundamental concepts of institutional scientific communication and the visibility of academic knowledge in networks such as Twitter/X. It represents the traditional axis of scientific dissemination.
- Cluster 2: *Engagement, science communication, science outreach, TikTok*. Predominantly terms linked to engagement with audiences and contemporary ways of bringing science closer to the public, especially through TikTok, by means of communication pills.
- Cluster 3: *Higher education, open science, scientific dissemination, YouTube*. The link between higher education and open science is highlighted, with YouTube as a key space for the production of extensive, audiovisual and educational dissemination content.
- Cluster 4: *Social science, social networks, university*. Finally, this cluster reflects a sociological and institutional approach to science outreach, focusing on the role of universities and social sciences in the construction of networked knowledge.

These clusters make it possible to map the conceptual intersections that make up the field of study, highlighting both the predominant approaches and the most representative digital channels in university science outreach.

3.1. Studies on university science outreach in DSNs

In order to go deeper into the approaches, methodologies and contributions of the selected studies, table 1 shows the main characteristics of each research.

Table 1.
Analysis of the selected studies

Studies	Type of study	Related SDG(s)	Social network(s) analysed
Ataide Malcher *et al.* (2025)	Literature review	SDG 4, SDG 9, SDG 16, SDG 17	Facebook, Instagram, Twitter/X, YouTube
Tejedor *et al.* (2025)	Qualitative study (interviews with publishers and visibility managers)	SDG 4, SDG 9, SDG 16, SDG 17	Twitter/X, LinkedIn, Facebook, YouTube, Blogs, Academia.edu
Almeida & Moreno-Rodríguez (2024)	Qualitative study (questionnaires and interviews)	SDG 4, SDG 5, SDG 10, SDG 17	Instagram, TikTok, Facebook, Twitter/X
Estrada Molina & Fuentes-Cancell (2024)	Quantitative study with control group and experimental group	SDG 4, SDG 9, SDG 17	LinkedIn, ResearchGate
Lopez *et al.* (2024)	Scoping review and mixed study with content analysis	SDG 4, SDG 9, SDG 16, SDG 17	TikTok
Kloppmann-Lambert & Carter-Thomas (2024)	Qualitative study with content, rhetorical and linguistic analysis	SDG 4, SDG 9, SDG 16, SDG 17	Twitter/X
Loureiro Cardoso *et al.* (2024)	Reflective-analytical study on the WEIWER® academic network	SDG 4, SDG 5, SDG 9, SDG 17	WEIWER® Academic Network
Lundgren *et al.* (2024)	Quantitative study with a longitudinal case study with network analysis, thematic modelling and diversity	SDG 4, SDG 9, SDG 17	Twitter/X @ TimeScavengers)
Muñoz-Gallego *et al.* (2024)	Qualitative study with narratological analysis of audio-visual content	SDG 4, SDG 9, SDG 16, SDG 17	TikTok
Phan *et al.* (2024)	Quantitative exploratory study with Bayesian statistics	SDG 4, SDG 9, SDG 17	Facebook, Twitter/X, Blogs
Rodríguez Muñoz & Socorro Castro (2024)	Reflective-analytical study (theoretical essay with analysis of experiences)	SDG 4, SDG 9, SDG 10, SDG 16, SDG 17	Facebook, YouTube, Telegram, WhatsApp
Sancho-Ortiz (2024)	Qualitative study (multimodal analysis of tweets)	SDG 4, SDG 13, SDG 15, SDG 17	Twitter/X

(Continua)

Studies	Type of study	Related SDG(s)	Social network(s) analysed
Said-Hung *et al.* (2024)	Mixed study (survey and semi-structured interviews)	SDG 4, SDG 5, SDG 9, SDG 17	Facebook, Twitter/X, LinkedIn, ResearchGate
Singh *et al.* (2024)	Quantitative study (surveys)	SDG 3, SDG 4, SDG 9, SDG 17	WhatsApp
Timpka, (2024)	Argumentative essay	SDG 3, SDG 4, SDG 16, SDG 17	Twitter/X, Mastodon, Bluesky, Pixelfed.
Velarde-Camaqui *et al.* (2024)	Mixed (quantitative and qualitative) study with content analysis	SDG 4, SDG 9, SDG 17	TikTok
Berezivska *et al.* (2023)	Qualitative study with documentary, comparative and institutional analysis	SDG 4, SDG 11, SDG 16, SDG 17	Facebook, Instagram
Eizmendi-Iraola & Peña-Fernández (2023)	Quantitative study with content analysis	SDG 4, SDG 5, SDG 9, SDG 17	Twitter/X, Facebook
Farnese, (2023)	Qualitative. Case study with content analysis	SDG 3, SDG 4, SDG 9, SDG 16, SDG 17	Facebook
Martinez-Sanz *et al.* (2023)	Quantitative-descriptive study with content analysis	SDG 3, SDG 4, SDG 16, SDG 17	TikTok
Martin Neira *et al.* (2023)	Literature review	SDG 4, SDG 16, SDG 17	TikTok
Gutiérrez-Sánchez *et al.* (2023)	Exploratory quantitative study (surveys)		ResearchGate, Google Scholar, Twitter/X, Facebook, LinkedIn, Instagram, Academia.edu
Gil & Guallar (2023)	Qualitative study (case studies)	SDG 4, SDG 2	Twitter/X, YouTube
Rezende & Drumond (2023)	Mixed study (content analysis and metrics)	SDG 4, SDG 9, SDG 17	Instagram, Facebook, Twitter/X
Raudenská & Topinková (2023)	Exploratory study with big data and web network analysis	SDG 4, SDG 9, SDG 16, SDG 17	Facebook, Twitter/X, YouTube, Instagram, LinkedIn
(Gil & Guallar, 2023)	Exploratory qualitative study with case study analysis	SDG 4, SDG 2	Twitter/X, YouTube
(Rezende & Drumond, 2023)	Mixed study (content analysis and alternative metrics)	SDG 4, SDG 9, SDG 17	Instagram, Facebook, Twitter/X
Raudenská & Topinková (2023)	Exploratory study (big data and network analysis)	SDG 4, SDG 9, SDG 16, SDG 17	Facebook, Twitter/X, YouTube, Instagram, LinkedIn
Carballeda Camacho & Ruiz del Olmo (2022)	Comparative case study with mixed methodology (content analysis)	SDG 4, SDG 9, SDG 17	Instagram
Hou *et al.* (2022)	Quantitative study with social network analysis and text mining	SDG 4, SDG 9, SDG 16, SDG 17	Twitter/X

(Continua)

Studies	Type of study	Related SDG(s)	Social network(s) analysed
Tur-Viñes *et al.* (2018)	Exploratory study with quantitative and content analysis	SDG 4, SDG 9, SDG 17	Twitter/X
Ojeda-Serna & García-Ruiz (2022)	Case study with mixed methodology (quantitative and qualitative)	SDG 4, SDG 10, SDG 16, SDG 17	YouTube
Rajas Fernández *et al.* (2022)	Theoretical-reflexive study with documentary analysis	SDG 4, SDG 9, SDG 17	YouTube, Instagram
Costa *et al.* (2021)	Qualitative study with narrative and mapping approach	SDG 4, SDG 10, SDG 16, SDG 17	Facebook, Instagram, YouTube
Fernandez-Diaz *et al.* (2021)	Mixed study (pre/post questionnaires and didactic proposal)	SDG 4, SDG 12, SDG 13, SDG 17	Instagram
Denia (2020)	Mixed study (computational and qualitative analysis)	SDG 4, SDG 16, SDG 17	Twitter/X
Hayes *et al.* (2020)	Exploratory and descriptive study with survey	SDG 4, SDG 9, SDG 12, SDG 17	TikTok
Ruiz-Corbella *et al.* (2020)	Quantitative descriptive study (empirical data analysis)	SDG 4, SDG 9, SDG 16, SDG 17	Facebook, Twitter, YouTube and Instagram, although it focuses on academic Blogs (Aula Magna 2.0),
Vizcaíno-Verdú *et al.* (2020)	Mixed study (video analysis)	SDG 4, SDG 9, SDG 17	YouTube
Denia (2021)	Theoretical and documentary review	SDG 4, SDG 9, SDG 17	Twitter/X
Conde-Caballero *et al.* (2019)	Mixed study based on case study (quantitative and qualitative with surveys and implementation)	SDG 3, SDG 4, SDG 9, SDG 17	Blogs, Twitter
Loizzo *et al.* (2019)	Qualitative case study with network observation	SDG 4, SDG 9, SDG 17	Twitter/X
Maggio *et al.* (2018)	Quantitative, bibliometric and correlational study	SDG 3, SDG 4, SDG 9, SDG 17	Twitter/X, Mendeley, Blogs
Campos Freire *et al.* (2014)	Mixed study. Case study with network analysis and metrics.	SDG 4, SDG 9, SDG 16, SDG 17	ResearchGate, Academia.edu, Facebook, Twitter/X, YouTube
Magalhães (2015)	Qualitative. Case study with documentary analysis	SDG 4, SDG 9, SDG 17	Facebook

3.2. Predominant approaches and methodologies and their contribution

Significant methodological diversity emerged, reflecting the emerging and transdisciplinary nature of university science outreach research in DSNs. For the purposes of this review, we classified the studies into five main approaches: quantitative, qualitative, mixed, reflexive-theoretical, and literature reviews. In this classification, *quantitative* designs—whether descriptive, correlational, or exploratory—use exclusively numerical data collection and analysis methods. *Mixed* designs combine quantitative and qualitative instruments, regardless of whether one approach predominates. This distinction allowed us to differentiate, for example, an *exploratory quantitative* study based solely on questionnaires from a *mixed* study that integrates questionnaires with interviews or qualitative content analysis.Quantitative approaches employ surveys, statistical analysis and digital metrics to measure faculty participation in DSN and to analyse their perceptions of science outreach as part of their professional work (Estrada Molina & Fuentes-Cancell, 2024; Eizmendi-Iraola & Peña-Fernández, 2023; Gutiérrez-Sánchez *et al*, 2023; Hayes *et al*., 2020; Hou *et al*., 2022; Lundgren *et al*., 2024; Maggio *et al*., 2018; Martínez-Sanz *et al*., 2023; Phan *et al*., 2024; Raudenská & Topinková, 2023; Ruiz-Corbella *et al*., 2020; Singh *et al*., 2024; Tur-Viñes *et al*., 2018; Velarde-Camaqui *et al*., 2024).

Qualitative studies explore teaching experiences, narratives and communicative practices in digital environments (Almeida & Moreno-Rodríguez, 2024; Berezivska *et al*., 2023; Costa *et al*, 2021; Farnese, 2023; Gil & Guallar, 2023; Kloppmann-Lambert & Carter-Thomas, 2024; Loizzo *et al*., 2019; Magalhães, 2015; Muñoz-Gallego *et al*., 2024; Sancho-Ortiz, 2024; Tejedor *et al*., 2025).

Mixed approaches combine content analysis, interviews, surveys and DSNs metrics, allowing for a triangulation of data that deepens the understanding of the phenomenon (see, for example, Carballeda Camacho & Ruiz del Olmo, 2022; López *et al*., 2024; Ojeda-Serna & García-Ruiz, 2022; Rezende & Drumond, 2023; Said-Hung *et al*., 2024).

Five studies adopt a theoretical-reflexive approach, developing conceptual analyses on the social role of the university as a promoter of open knowledge and scientific literacy (Denia, 2021; Loureiro Cardoso *et al*., 2024; Rajas Fernández *et al*., 2022; Rodríguez Muñoz & Socorro Castro, 2024; Timpka, 2024).

Finally, two studies correspond to literature reviews (documentary, integrative or scoping), which allow us to map trends, consolidate emerging practices and build common theoretical frameworks (Ataide Malcher *et al*., 2025; Martin Neira *et al*., 2023).

Taken together, this methodological diversity allows for a broad understanding of the phenomenon and reinforces the idea that digital science outreach is a strategic way for universities to strengthen their social role in the 21st century.

3.3. DSNs most used by university faculty for science outreach and open access to knowledge

The studies analyse 13 DSNs, five of which are the most widely used: Twitter/X, Facebook, Instagram, YouTube and TikTok.

Twitter/X stands out as the most widely used platform due to its microblogging format, ideal for sharing academic publications, events and educational resources, and for fostering dialogue between science and citizens (Campos Freire *et al*, 2014; Denia, 2020, 2021; Tejedor *et al*., 2025; Said-Hung *et al*., 2024; Gil & Guallar, 2023; Almeida & Moreno-Rodríguez, 2024; Loizzo *et al*., 2019; Rezende & Drumond, 2023; Tur-Viñes *et al*., 2018).

Facebook appears as an institutional channel to disseminate scientific news, teaching resources and campaigns aimed at different audiences (Campos Freire *et al*., 2014; Tejedor *et al*., 2025; Rezende & Drumond, 2023; Said-Hung *et al*., 2024; Rodríguez Muñoz & Socorro Castro, 2024; Almeida & Moreno-Rodríguez, 2024; Costa *et al*., 2021; Gutiérrez-Sánchez *et al*., 2023; Phan *et al*., 2024).

Instagram is valued for its visual appeal and proximity to young audiences, through the use of infographics, short videos and content adapted to the digital culture (Carballeda Camacho & Ruiz del Olmo, 2022; Fernandez-Díaz *et al*., 2021; Rezende & Drumond, 2023; Gutiérrez-Sánchez *et al*., 2023; Costa *et al*., 2021; Almeida & Moreno-Rodríguez, 2024; Rajas Fernández *et al*., 2022).

YouTube offers a space for more extensive audiovisual dissemination content, such as interviews, training capsules and conferences (Tejedor *et al*., 2025; Rajas Fernández *et al*., 2022; Ojeda-Serna & García-Ruiz, 2022; Gil & Guallar, 2023; Campos Freire *et al*., 2014; Rodríguez Muñoz & Socorro Castro, 2024; Costa *et al*., 2021).

TikTok emerges as an innovative network for outreach with brief, creative and emotional styles, seeking to attract non-specialised audiences (Martínez-Sanz *et al*., 2023; Martin Neira *et al*., 2023; Muñoz-Gallego *et al*., 2024; Hayes *et al*., 2020; Almeida & Moreno-Rodríguez, 2024).

Other platforms, although less frequent, also appear in the corpus: LinkedIn (5 studies), ResearchGate and academic blogs (4 each), WhatsApp and Academia.edu (2), as well as Telegram, Mastodon and BlueSky with only one mention.

In summary, university faculty use a diverse ecosystem of DSNs to disseminate science, alternating between institutional and personal strategies, and moving from traditional platforms to more visual, participatory and accessible formats.

Recommendations for training university faculty in the strategic and ethical use of DSN with a commitment to human rights and sustainability

Nine of the 46 studies make explicit recommendations for the training of university faculty in the strategic and ethical use of DSNs for science outreach purposes, consistent with human rights and sustainability (Costa *et al*, 2021; Vizcaíno-Verdú *et al*., 2020; Estrada Molina & Fuentes-Cancell, 2024; Ruiz-Corbella *et al*., 2020; Fernandez-Diaz *et al*., 2021; Rajas Fernández *et al*., 2022; Almeida & Moreno-Rodríguez, 2024; Phan *et al*., 2024; Farnese, 2023). These studies agree on the need to integrate media and digital competences not only as technical skills, but also as critical capacities to communicate science in an inclusive, participatory and socially engaged way.

The recommendations cover critical digital literacy, mastery of visual and audiovisual language, the use of open licences, and the adaptation of content to diverse audiences, taking into account inequalities of access, digital vulnerability and cultural diversity. It also underlines the importance of pedagogical training that allows teachers to use DSN as a tool for knowledge transfer, strengthening institutional commitment to the 2030 Agenda.

In addition to these studies that make explicit recommendations, a significant part of the reviewed corpus provides substantive elements that allow us to infer key media competences in university teacher training. Although these studies do not directly address faculty training, they do offer relevant information on dissemination practices in DSNs, the type of content shared, the communicative strategies used, or the role of platforms in the university-society relationship. These contributions allow to identify competences such as mastery of digital language, interaction with diverse audiences, the use of visual resources (aesthetics) and the ethical and ideological orientation of the discourse, in line

with the dimensions proposed by Ferrés and Piscitelli (2012). They can also be aligned with the Digital Teaching Competence Framework 2.2 (INTEF, 2022), especially in the areas of communication, digital content creation and professional engagement. This evidence justifies the need to integrate science outreach as a transversal competence in teacher education, based on critical media literacy and an ethical commitment to equitable access to knowledge.

3.4. Digital science outreach, SDGs and university commitment to sustainable development

The analysis of the studies reveals a close link between university-driven digital science outreach practices and various SDGs, showing an orientation towards social, ethical, and educational goals. SDG 4 (Quality Education) appears in all 46 articles reviewed. Its presence was inferred from the thematic focus, objectives, and content of the studies—rather than always from explicit citations—given its alignment with university efforts to improve access to scientific knowledge, promote lifelong learning, and foster a critical and well-informed citizenry.Furthermore, SDG 17 (Partnerships for achieving the goals) stands out as a cross-cutting theme, as science outreach in DSNs is conceived as a collaborative strategy involving faculty, scientific communities, educational institutions, the media and digital audiences, thus strengthening the links between science and society through open knowledge transfer and citizen participation.

Other SDGs also have significant linkages. SDG 9 (Industry, innovation and infrastructure) appears in 33 studies, associated with the innovative use of digital technologies, the creation of accessible audiovisual formats and the development of virtual infrastructures for science communication. SDG 16 (Peace, justice and strong institutions), identified in 19 studies, is linked to the promotion of the right to accurate information, scientific transparency and the strengthening of educational institutions committed to democratic values and human rights. To a lesser extent, connections with SDG 3 (Health and well-being) are observed in 6 studies, SDG 10 (Reducing inequalities) in 5, SDG 5 (Gender equality) in 4, and, to a lesser extent, with SDG 13, SDG 12, SDG 15 and SDG 11.

In addition, the analysis of code co-occurrences carried out using ATLAS.ti shows specific relationships between DSNs platforms and certain SDGs. Facebook and Twitter/X are highly associated with SDG 4 and SDG 17, while TikTok and YouTube are mainly linked to SDG 9 and also SDG 4, suggesting a strategic diversification in the use of digital platforms to contribute to different targets of the 2030 Agenda.

These findings confirm that university science outreach in DSNs is not limited to the dissemination of knowledge, but is configured as a strategic tool to advance multiple dimensions of social sustainability, thus reinforcing the commitment of universities to their social responsibility and their active role in the transformation of societies.

Figure 4 shows the distribution of the coded fragments linking the main DSNs analysed with the SDGs identified in the studies reviewed. This representation allows visualising the patterns of association between platforms and sustainability goals, highlighting the prominence of certain SDGs in university science dissemination through DSNs.

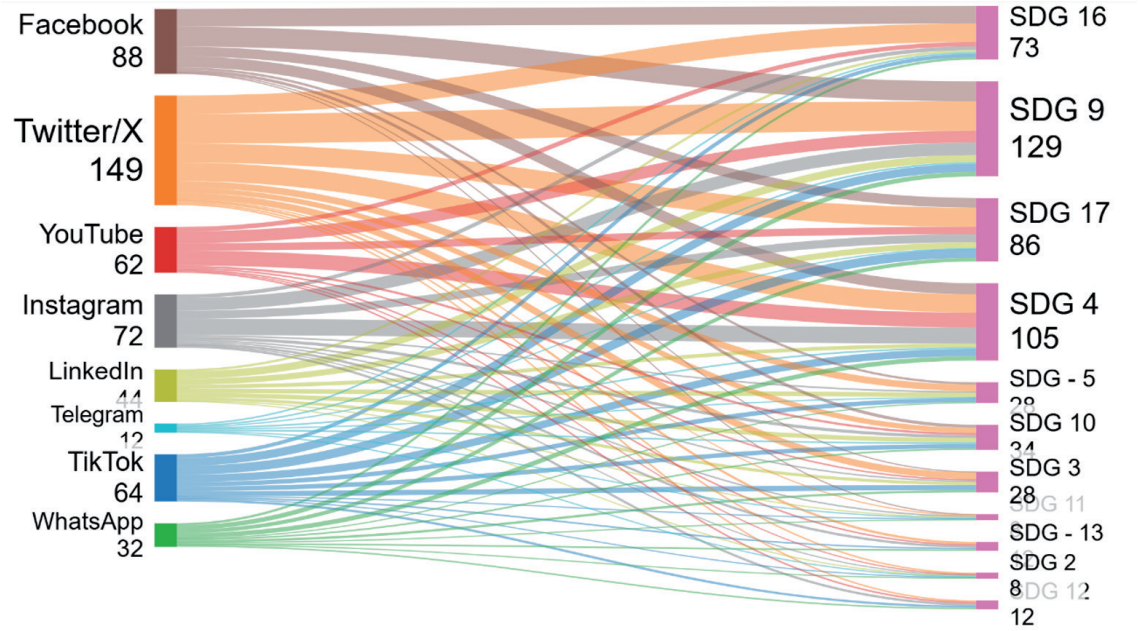

Figure 4. Association between DSNs and SDGs in the studies analysed.

Figure 5 summarises the relationship flows between the DSNs used, the SDGs addressed and the predominant types of study in the corpus analysed. This visualisation facilitates the understanding of research dynamics and shows how the choice of certain platforms and methodological approaches affects contributions to sustainable development from higher education.

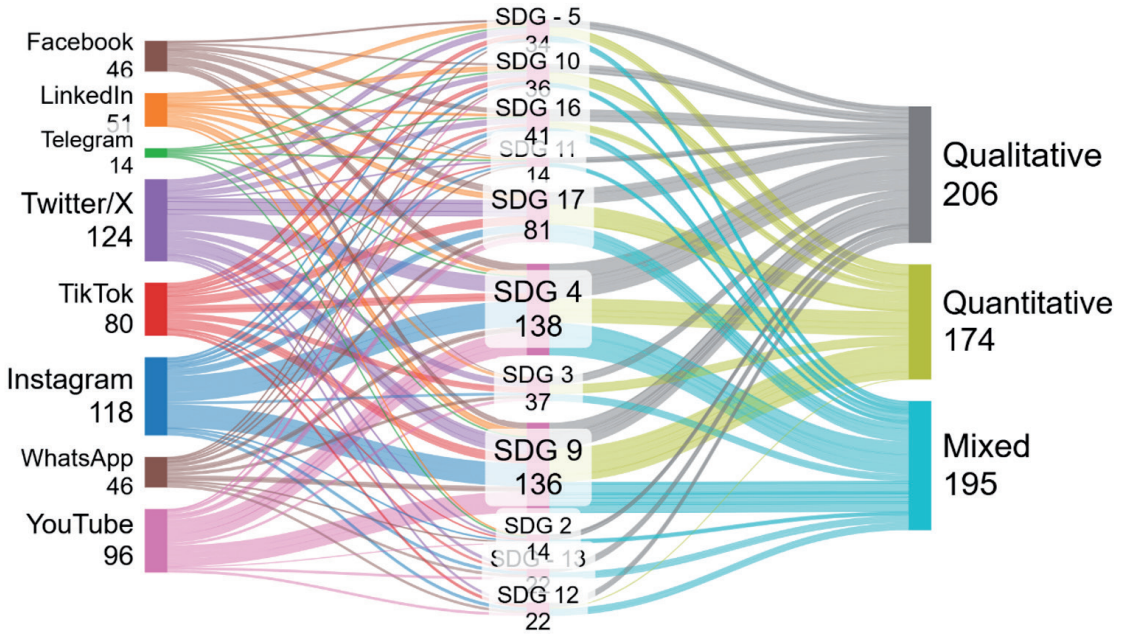

Figure 5. Interrelationships between DSNs, SDGs and types of study.

4. Discussion

Before discussing the research questions, it is worth highlighting two key trends: the sustained growth of scientific production on science outreach in DSNs since 2020 and the formation of thematic clusters around institutional communication, engagement, open science and the social role of the university. These elements link science outreach with sustainability, human rights and the social commitment of higher education.

4.1. Q1. Analysis of the findings in the light of the sustainability framework, human rights and Agenda 2030

The methodological diversity observed in the studies reviewed reflects the inherent complexity of the phenomenon of science outreach in DSNs. This plurality not only allows us to analyse communicative practices from a descriptive or technical perspective, but also enables a deeper understanding of their pedagogical, social and ethical implications.

Qualitative approaches have captured with particular richness the experiential dimension of outreach processes, especially through the analysis of teachers' narratives, social representations and expressive strategies. These studies underline the role of university professors as mediators between academic knowledge and citizens, reaffirming their social responsibility in the generation of an accessible and socially committed scientific culture.

In turn, quantitative and mixed approaches have been fundamental to measure the degree of institutional and teaching appropriation of these practices, as well as to highlight gaps in the strategic use of DSN. The adoption of methodological triangulation strategies has also favoured the evaluation of the impact of scientific dissemination in terms of interaction, citizen participation and democratisation of academic knowledge.

Finally, the theoretical studies and systematic reviews analysed contribute to positioning science outreach as a transversal axis in the university commitment to the 2030 Agenda, considering that 90.5% of the studies (38 out of 46) focus on the field of higher education. From this perspective, the methodologies used not only make it possible to investigate an emerging communicative phenomenon, but also reveal the degree to which universities assume their mission to actively contribute to social sustainability, equity and the promotion of human rights through practices of openness, collaboration and transfer of scientific knowledge.

4.2. Q2. The use of DSNs for science outreach

The analysis of the most widely used DSNs in the studies reviewed shows a clear evolution in the ways of communicating science from the university environment. Platforms such as Twitter/X and Facebook, used for academic dissemination, now coexist with TikTok and Instagram, which promote participation and open access to knowledge.

The intensive use of Twitter/X as a microblogging tool reflects its consolidation as a privileged space for science outreach in real time, favouring direct interaction between researchers, students and civil society. For its part, Facebook maintains a relevant role as an institutional communication channel, especially in Latin American contexts, where it reinforces its usefulness in strategies for the social transfer of academic knowledge.

The emergence of more visual networks such as Instagram and TikTok also signals a significant change in scientific narratives and in the relationship between professors

and digital audiences. These platforms allow for more accessible, emotional and creative formats, which not only amplify the reach of scientific literacy, but also promote a more inclusive and pluralistic knowledge culture.

Taken together, this picture confirms that DSNs not only expand the technical possibilities of science outreach, but also transform the ways in which universities exercise their social responsibility. The choice of certain platforms, and the modes of interaction adopted in them, involve pedagogical, ethical and political decisions that have a direct impact on information equity, the right to knowledge and the formation of a critical citizenship, fully in line with the principles of the 2030 Agenda and the SDGs.

4.3. Q3. Teacher training in the face of the challenge of digital dissemination

The results show that the training of university faculty in the strategic and ethical use of DSNs for scientific dissemination is still in its infancy, although it is increasingly necessary. Although only some of the studies reviewed offer explicit training recommendations, the body of evidence indicates that these competences should be understood from an integral perspective that goes beyond the mere technical dimension, encompassing ethical, communicative and social aspects.

In this sense, the studies that directly address teacher training coincide in highlighting the importance of incorporating content related to critical digital literacy, the design of accessible narratives, communication ethics and knowledge of regulatory frameworks related to open science and copyright into training programmes.

In a complementary way, a significant proportion of studies - although not specifically focused on training - provide relevant clues from communicative and media perspectives. These studies underline the need for teachers to develop educommunication competences, such as those formulated by Ferrés and Piscitelli (2012), in dimensions such as language, interaction, aesthetics and ideology. They also insist on the importance of strengthening the digital teaching competences set out in the Framework of Reference for Digital Teaching Competence 2.2 (INTEF, 2022).

Overall, training university facluty in these competences is essential for them to be able to play a critical mediating role between academic knowledge and citizens, promoting scientific dissemination geared towards the common good, social justice and equitable access to knowledge. This perspective, fully in line with the principles of human rights and the commitments set out in the SDGs, reinforces the strategic role of the university as an agent of social transformation in the digital era.

4.4. Q.4 Digital dissemination as an institutional commitment to sustainable development

The results obtained show that science outreach in DSNs constitutes a strategic educational practice to advance the fulfilment of multiple SDGs, especially in the university context. The universal link with SDG 4 (Quality education) and SDG 17 (Partnerships for achieving the goals) confirms that these practices not only broaden democratic access to scientific knowledge, but also promote active collaboration between university, society and digital communities, reinforcing the role of higher education institutions as key agents of social transformation.

The significant presence of SDG 9 (Industry, innovation and infrastructure) highlights the capacity of DSNs to generate more innovative learning and communication environments, while the link with SDG 16 (Peace, justice and strong institutions) underlines

their potential to strengthen democratic values and ensure citizens' right to accurate, pluralistic and accessible scientific information. These findings ratify the university's commitment not only as a generator of knowledge, but also as an institution responsible for promoting sustainable development, social justice and the formation of a critical and committed citizenry.

From this perspective, digital science outreach is configured as a concrete and strategic way of university social responsibility, fully aligned with the principles of the 2030 Agenda and with the mission of building more informed, participatory and inclusive societies in the context of sustainable development.

4.5. Critical approaches to digital science outreach in universities

The results obtained allow us to draw a broad and articulated picture of the role of DSNs in university science outreach, as well as their implications for sustainability, teacher training and human rights. Overall, the findings are in line with recent studies that point to the potential of these platforms to democratise scientific knowledge, break down institutional barriers and generate spaces for dialogue between science and society (Lo *et al.*, 2020; Perryman & Clements, 2019; Vizcaíno-Verdú *et al.*, 2020).

In relation to methodological approaches, the tendency to adopt qualitative and mixed designs is confirmed, as occurs in other emerging fields where it is necessary to capture the complexity of social and cultural practices in digital environments. This coincidence with previous reviews (Tur-Viñes *et al.*, 2018) reinforces the need to employ triangulated methodologies that combine discursive analysis, digital metrics and pedagogical perspectives. However, there is a paucity of longitudinal or comparative studies, which limits the ability to assess the sustained impact of these practices on academic culture or student learning.

Regarding the use of DSNs, the results are congruent with previous research that positions Twitter/X as the most used platform for academic outreach, followed by Facebook and, more recently, Instagram and TikTok (Velarde-Camaqui *et al.*, 2024). However, this study adds value by identifying not only the frequency of use, but also the narrative forms and expressive strategies that characterise these practices, as well as their alignment with values of accessibility, participation and equity.

In terms of teacher training, there is a significant gap in empirical studies that systematically address teacher preparation for digital science outreach. Although some research offers specific recommendations, this study shows that most of the communicative and media approaches are not yet translated into concrete curricular or institutional proposals. This training gap represents a key opportunity for universities to strengthen their commitment to open science and to the development of critical media and digital competences, such as those proposed by Ferrés and Piscitelli (2012) and the Framework of Reference for Digital Teaching Competence 2.2 (INTEF, 2022).

This study provides a strategic look at the potential of scientific dissemination in DSNs as a tool for institutional transformation and social engagement, systematically making visible how higher education can contribute to the SDGs through concrete and responsible communication practices. By integrating the perspective of media literacy, critical analysis of the SDGs and the 2030 Agenda, this research provides a solid basis for future research, teacher training programmes and university policies for inclusive, sustainable and transformative science outreach.

4.6. Implications of the study

This study offers a comprehensive approach to the relationship between science outreach practices in DSNs and contribution to the SDGs, evidencing the strategic role of these platforms in strengthening university social responsibility. The results suggest that the intentional use of networks such as Twitter/X, Instagram and TikTok not only broadens access to knowledge, but also reinforces institutional commitment to quality education, innovation and the building of partnerships for sustainable development.

Furthermore, the methodological diversity observed shows the need to foster critical digital competences and advanced communication skills in teachers, aimed at a more inclusive, accessible and coherent scientific dissemination in line with the principles of the 2030 Agenda. Overall, the findings highlight the importance of incorporating digital science outreach as a cross-cutting component in teacher training strategies and in the social responsibility policies of higher education institutions.

4.7. Limitations and future lines of research

This study, based on the analysis of 46 research studies from databases such as WoS, Scopus and Dialnet, in Spanish, English and Portuguese, offers a representative overview of the field, although it has some limitations. The heterogeneity of approaches and theoretical frameworks makes it difficult to systematically compare the results, and there is a lack of longitudinal, comparative studies between regions and specific studies on teacher training in digital science outreach.

As future lines, it is proposed to extend the analysis to other databases and languages, to incorporate DSNs analysis techniques that delve deeper into the patterns of dissemination in higher education and to develop research that assesses the impact of these practices on teacher training and critical citizenship, in line with the 2030 Agenda and the SDGs.

5. Conclusions

Scientific conclusions

This systematic review confirms the strategic role of DSNs in university science outreach, promoting knowledge democratisation, fostering citizen participation, and reinforcing institutional commitment to the SDGs—particularly Goals 4 and 17. The wide methodological diversity observed reflects the field's complexity and transdisciplinary scope. Although faculty training in this area remains limited, the analysed studies consistently identify key competencies for effective digital science outreach: media literacy, communication ethics, digital critical thinking, and narrative adaptation.

Normative and institutional proposals

These findings suggest that universities should integrate these competencies into faculty development programmes and recognise digital science outreach as a core professional skill. Embedding this capacity within institutional policies on social responsibility, sustainability, and human rights would enhance the transformative potential of higher education in the digital environment. Operationally, this could involve including digital

science outreach competencies in academic promotion criteria, allocating institutional resources for training, and fostering cross-departmental initiatives to align outreach with the SDGs.

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7. References

Almeida, J. V. V. de, & Moreno-Rodríguez, A. S. (2024). Divulgação científica nas redes sociais digitais: experiências e implicações para a formação de licenciandos em biologia. *Investigações Em Ensino de Ciências*, *29*(2), 460-478. https://doi.org/10.22600/1518-8795.ienci2024v29n2p460

Ataide Malcher, M., Alves Guedes, S. M., Raiol, W., Araujo da Silva, E. M., & Brasil de Carvalho, V. (2025). Interatividade, confiabilidade e engajamento: 22 anos de estudos sobre comunicação pública da ciência em redes sociais on-line. *Observatory (OBS*), 19*(1), 300-319.

Berezivska, L. D., Mikhno, O. P., & Pinchuk, O. P. (2023). Online projects as a form of spreading pedagogical biographical knowledge in the context of open science. *Information Technologies and Learning Tools*, *97*(5), 227-243. https://doi.org/10.33407/itlt.v97i5.5240

Bucchi, M., & Trench, B. (2021). Science Communication as the Social Conversation Around Science. In M. Bucchi & B. Trench (Eds.), *Routledge Handbook of Public Communication of Science and Technology* (3rd ed.). Routledge. https://www.routledge.com/Routledge-Handbook-of-Public-Communication-of-Science-and-Technology/Bucchi-Trench/p/book/9780367702946

Campos Freire, F., Rivera Rogel, D., & Rodríguez Hidalgo, C. (2014). La presencia e impacto de las universidades de los países andinos en las redes sociales digitales. *Revista Latina de Comunicación Social*, *69*, 571–592. https://doi.org/10.4185/RLCS-2014-1025

Carballeda Camacho, M., & Ruiz del Olmo, F. J. (2022). La comunicación científica en Instagram destinada al público infantil: los casos de @muyinteresantejunior y @revistacucu. *Fonseca, Journal of Communication*, *25*, 35–59. https://doi.org/10.14201/fjc.29689

Castaños, P. (2017). ¿Qué es la divulgación científica? In R. Pérez Tamayo (Ed.), *La divulgación de la ciencia: Una mirada desde América Latina* (pp. 17–35). Siglo XXI Editores.

Conde-Caballero, D., Castillo, C. A., Ballesteros-Yáñez, I., & Mariano-Juárez, L. (2019). Blogging as a tool for the acquisition and dissemination of knowledge in health sciences: a preliminary evaluation. *International Journal of Educational Technology in Higher Education*, *16*(1), 30. https://doi.org/10.1186/s41239-019-0161-2

Costa, A. M. F. F. R. da, Almeida, W. C. de, & Santos, E. O. dos. (2021). Eventos científicos online: o caso das lives em contexto da COVID-19. *Práxis Educacional*, *17*(45), 1-16. https://doi.org/10.22481/praxisedu.v17i45.8340

Denia, E. (2020). The impact of science communication on Twitter: The case of Neil deGrasse Tyson. *Comunicar*, *28*(65), 21-30. https://doi.org/10.3916/C65-2020-02

Denia, E. (2021). Twitter como objeto de investigación en comunicación de la ciencia. *Revista Mediterránea de Comunicación*, *12*(1), 289. https://doi.org/10.14198/MEDCOM000006

Díaz-Iso, A., Eizaguirre, A., & García-Olalla, A. (2020). Una revisión sistemática del concepto de actividad extracurricular en Educación Superior. *Educación XX1*, *23*(2), 307–335. https://doi.org/10.5944/EDUCXX1.25765

Eizmendi-Iraola, M., & Peña-Fernández, S. (2023). La visibilidad de las mujeres científicas en la comunicación externa de las universidades a través de las redes sociales. *Doxa Comunicación. Revista Interdisciplinar de Estudios de Comunicación y Ciencias Sociales*, 245–261. https://doi.org/10.31921/doxacom.n37a1861

Estrada Molina, O., & Fuentes-Cancell, D. R. (2024). El uso de ResearchGate y LinkedIn para elevar la motivación por la lectura académica: un estudio experimental. *Revista Fuentes*, *2*(26), 292–304. https://doi.org/10.12795/revistafuentes.2024.24172

Farnese, P. (2023). Estratégias de uma universidade pública brasileira para comunicar a ciência na pandemia da COVID-19. *Index.Comunicación*, *13*(1), 129-151. https://doi.org/10.33732/ixc/13/01Estrat

Fernandez-Diaz, M., Robles-Moral, F. J., & Ayuso-Fernández, G. E. (2021). Una propuesta para trabajar la competencia digital docente a través de Instagram y el Pensamiento Visual: el estudio de la sostenibilidad. *Revista Latinoamericana de Tecnología Educativa - RELATEC*, *20*(1), 87–102. https://doi.org/10.17398/1695-288X.20.1.87

Ferrés, J., & Piscitelli, A. (2012). La competencia mediática: propuesta articulada de dimensiones e indicadores. *Comunicar*, *19*(38), 75–82. https://doi.org/10.3916/C38-2012-02-08

Gil, L., & Guallar, J. (2023). Científicos en redes sociales. Divulgación y curación de contenidos en twitter: taxonomía y casos. *Index.Comunicación*, *13*(1), 55–77. https://doi.org/10.33732/IXC/13/01CIENTI

Gil-Fernández, R., & Calderón-Garrido, D. (2021). The Use of Social Media in Education: A Systematic Review of the Scientific Literature. *Digital Education Review*, *40*, 82-109.

Gutiérrez-Sánchez, J. D., Said-Hung, E., & García-Sanjuán, N. (2023). Utilidad de las redes sociales en la divulgación científica de las ciencias sociales en España. *Educar*, *59*(2), 387-402. https://doi.org/10.5565/rev/educar.1632

Hayes, C., Stott, K., Lamb, K. J., & Hurst, G. A. (2020). "Making Every Second Count": Utilizing TikTok and Systems Thinking to Facilitate Scientific Public Engagement and Contextualization of Chemistry at Home. *Journal of Chemical Education*, *97*(10), 3858-3866. https://doi.org/10.1021/acs.jchemed.0c00511

Hou, J., Wang, Y., Zhang, Y., & Wang, D. (2022). How do scholars and non-scholars participate in dataset dissemination on Twitter. *Journal of Informetrics*, *16*(1), 101223. https://doi.org/10.1016/j.joi.2021.101223

INTEF (2022). *Marco de Referencia de la Competencia Digital Docente*. Ministry of Education and Vocational Training.

Kloppmann-Lambert, C., & Carter-Thomas, S. (2024). X (Twitter) in the university context: Functions, forms and disciplinary variations of research tweets. *Ibérica*, *48*, 13-42. https://doi.org/10.17398/2340-2784.48.13

Lockwood, C., Munn, Z., & Porritt, K. (2015). Qualitative research synthesis. *International Journal of Evidence-Based Healthcare*, *13*(3), 179-187. https://doi.org/10.1097/XEB.0000000000000062

Loizzo, J., Jones, C., & Steffen, A. (2019). A Pilot Qualitative Case Study of Agricultural and Natural Resources Scientists' Twitter Usage for Engaging Public Audiences. *Journal of Applied Communications*, *103*(4). https://doi.org/10.4148/1051-0834.2276

Lopez, D.-C., Freire, M., & Barros, K. (2024). Mapeo de las modalidades de comunicación científica en TikTok: un análisis descriptivo del hashtag #CienciaNoTikTok. *Revista Mediterránea de Comunicación*, *15*(1), 163–180. https://doi.org/10.14198/MEDCOM.25508

Loureiro Cardoso, T. M., Pinto, J. P., & Pestana, F. (2024). Networked research and open science: the WEIWER® experience. *Educational Media International*, *61*(1-2), 16-25. https://doi.org/10.1080/09523987.2024.2357475

Lundgren, L., Bex, R. T., Bauer, J., Lam, A., & Slater, E. (2024). Characterizing an online, science-based affinity space using topic modelling, diversity indices, and social network analysis. *Cogent Education*, *11*(1). https://doi.org/10.1080/2331186X.2024.2402158

Magalhães, R. (2015). A Comunicação Estratégicação aplicada à divulgação da Ciência: O caso do Centro de Estudos de Comunicação e Sociedade. *Observatory (OBS*)*, *9*(4), 51-84.

Maggio, L. A., Leroux, T. C., Meyer, H. S., & Artino Jr., A. R. (2018). #MedEd: exploring the relationship between altmetrics and traditional measures of dissemination in health professions education. *Perspectives on Medical Education*, *7*(4), 239-247. https://doi.org/10.1007/S40037-018-0438-5

Marchal, N., Hoes, E., Klüser, K. J., Hamborg, F., Alizadeh, M., Kubli, M., & Katzenbach, C. (2025). How Negative Media Coverage Impacts Platform Governance: Evidence from Facebook, Twitter, and YouTube. *Political Communication*, *42*(2), 215-233. https://doi.org/10.1080/10584609.2024.2377992

Martin Neira, J. I., Trillo-Domínguez, M., & Olvera-Lobo, M.-D. (2023). De la televisión a TikTok: Nuevos formatos audiovisuales para comunicar ciencia. *Comunicación y Sociedad*, *20*, 1–27. https://doi.org/10.32870/CYS.V2023.8441

Martínez-Sanz, R., Buitrago, Á., & Martín-García, A. (2023). Comunicación para la salud a través de TikTok. Estudio de influencers de temática farmacéutica y conexión con su audiencia. *Revista Mediterránea de Comunicación*, *14*(1), 83–98. https://doi.org/10.14198/MEDCOM.23435

Martin-Neira, J. I., Trillo Domínguez, M., & Olvera-Lobo, M. D. (2023). Las redes sociales como vehículo del periodismo científico: 'Scoping Review'. *Index.Comunicación*, *13*(1), 105–127. https://doi.org/10.33732/IXC/13/01LASRED

Moher, D., Shamseer, L., Clarke, M., Ghersi, D., Liberati, A., Petticrew, M., Shekelle, P., Stewart, L. A., Estarli, M., Barrera, E. S. A., Martínez-Rodríguez, R., Baladia, E., Agüero, S. D., Camacho, S., Buhring, K., Herrero-López, A., Gil-González, D. M., Altman, D. G., Booth, A., … Whitlock, E. (2016). Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. *Revista Espanola de Nutricion Humana y Dietetica*, *20*(2), 148-160. https://doi.org/10.1186/2046-4053-4-1/TABLES/4

Moreno, C. B., Carretero, M. R. M., de Santiago, B. S. R., & Rumayor, L. R. (2024). Gamificación-educación: el poder del dato. El profesorado en las redes sociales. *RIED-Revista Iberoamericana de Educación a Distancia*, *27*(1), 373–396. https://doi.org/10.5944/RIED.27.1.37648

Muñoz-Gallego, A., Giri, L., Nahabedian, J. J., & Rodríguez, M. (2024). Audiovisual Narratives on Tik Tok: New Challenges for Public Communication of Science and Technology. *Revista Mediterránea de Comunicación*, *15*(1), 144-162. https://doi.org/10.14198/MEDCOM.25481

Navarro-González, I., & Gavari-Starkie, E. (2024). La educación sostenible y resiliente en el currículum de la LOMLOE. *Revista Española de Educación Comparada*, *45*, 376–397. https://doi.org/10.5944/REEC.45.2024.37968

Occa, A., Chen, H. Y., & Teffeteller, K. L. (2024). Using Online Memes to Communicate About Health: A Systematic Review. *American Journal of Health Promotion*, *39*(2). https://doi.org/10.1177/08901171241272075/SUPPL_FILE/SJ-PDF-1-AHP-10.1177_08901171241272075.PDF

Ojeda-Serna, V., & García-Ruiz, R. (2022). Divulgación científica en YouTube en Latinoamérica. Estudio de Casos de universidades, museos y YouTubers. *Revista Eureka Sobre Enseñanza y Divulgación de Las Ciencias*, *19*(2), 1–17. https://doi.org/10.25267/Rev_Eureka_ensen_divulg_cienc.2022.v19.i2.2204

Phan, Q. A., Ho, M. T., Vuong, Q. H., Pham, H. H., Vu, M. H., Ha Nguyen, T. T., & Thi Phan, T. T. (2024). Science communication matters: An exploratory study of academic public engagement in Vietnam using Bayesian statistics. *Journal of Contemporary Eastern Asia*, *23*(1), 35-57. https://doi.org/10.17477/JCEA.2024.23.1.035

Powell, J., & Pring, T. (2024). The impact of social media influencers on health outcomes: Systematic review. *BMJ Open*, *14*(1), e072345. https://doi.org/10.1016/J.SOCSCIMED.2023.116472

Rajas Fernández, M., Alves, P., & Muñiz, C. (2022). Creación y difusión de contenidos audiovisuales y multimedia: la transformación educativa y científica en marcha. *Index.Comunicación*, *12*(2), 13–27. https://doi.org/10.33732/ixc/12/02Creaci

Raudenská, P., & Topinková, R. (2023). The #Scicomm Phenomenon: Using and Analysing Big Data to Track Science Communication on Czech Research Institutional Websites. *Czech Sociological Review*, *59*(4), 387-415. https://doi.org/10.13060/csr.2023.004

Redecker, C. (2017). *European Framework for the Digital Competence of Educators: DigCompEdu* (Y. Punie, Ed.). Publications Office of the European Union.

Rezende, L. V. R., & Drumond, L. B. B. (2023). Comunicando ciência: o uso das redes sociais públicas pelos periódicos científicos brasileiros da Área "Comunicação e Informação". *RDBCI Revista Digital de Biblioteconomia e Ciência Da Informação*, *21*. *https://doi*.org/10.20396/rdbci.v21i00.8672917

Rodríguez Muñoz, R., & Socorro Castro, A. R. (2024). Ciencia abierta y redes sociales una relación para incrementar la comunicación del conocimiento científico. *Virtualidad, Educación y Ciencia, 15*(28), 55–70.

Ruiz-Corbella, M., López-Gómez, E., Arteaga-Martínez, B., & Galán, A. (2020). Visibilidad, impacto y transferencia del conocimiento en revistas científicas de educación: la experiencia de Aula Magna 2.0. *RELIEVE - Revista Electrónica de Investigación y Evaluación Educativa*, *26*(2). https://doi.org/10.7203/relieve.26.2.17616

Said-Hung, E., Martín-Gutiérrez, A., & Marcano, B. (2024). A study of social media use for scientific communication and dissemination among Spanish education researchers. *Knowledge Management & E-Learning: An International Journal*, 237-258. https://doi.org/10.34105/j.kmel.2024.16.012

Saiz, B. C., & Nieto, B. G. (2021). El uso de redes sociales y su implicación para la comunicación en salud. Revisión bibliográfica sobre el uso de Twitter y la enfermedad del cáncer. *Doxa Comunicación. Revista Interdisciplinar de Estudios de Comunicación y Ciencias Sociales*, *33*, 377–392. https://doi.org/10.31921/doxacom.n33a868

Sancho-Ortiz, A. E. (2024). Analysing the Functionality of Twitter for Science Dissemination in EFL Teaching and Learning. *Profile: Issues in Teachers' Professional Development*, *26*(1), 133-147. https://doi.org/10.15446/profile.v26n1.105685

Singh, N. K., Singh, A. N., Patni, B., Tewari, A., & Phatak, S. (2024). Leveraging the use of a social media app as a collaborative medical information and knowledge sharing tool-insights from experiential use and survey of a CME WhatsApp community. *BMC Medical Education*, *24*(1), 960. https://doi.org/10.1186/s12909-024-05941-x

Soto, J. M. S., Gomez, H. E. L., Riveros, U. I. A., & Infantes, M. S. (2024). Impact of the COVID-19 pandemic on scientific communication: A review. *Iberoamerican Journal of Science Measurement and Communication*, *4*(2), 1-16. https://doi.org/10.47909/IJSMC.107

Tang, W., Hu, J., Zhang, H., Wu, P., & He, H. (2015). Kappa coefficient: a popular measure of rater agreement. *Shanghai Archives of Psychiatry*, *27*(1), 62-67. https://doi.org/10.11919/j.issn.1002-0829.215010

Tejedor, S., Romero-Rodríguez, L. M., Martínez-Fernández, J., & Rull-Ribó, D. (2025). Divulgación y visibilidad de revistas científicas en ciencias sociales. *Revista Científica General José María Córdova*, *23*(49), 41–62. https://doi.org/10.21830/19006586.1407

Timpka, T. (2024). Time for Medicine and Public Health to Leave Platform X. *JMIR Medical Education*, *10*, e53810-e53810. https://doi.org/10.2196/53810

Tur-Viñes, V., Segarra-Saavedra, J., & Hidalgo-Marí, T. (2018). Use of Twitter in Spanish Communication Journals. *Publications*, *6*(3), 34. https://doi.org/10.3390/publications6030034

UNESCO (2018). *UNESCO ICT Competency Framework for Teachers* (3rd ed.). United Nations Educational, Scientific and Cultural Organization,. https://unesdoc.unesco.org/ark:/48223/pf0000265721

UNESCO. (2021). *UNESCO Recommendation on Open Science*. United Nations Educational, Scientific and Cultural Organization. https://doi.org/10.54677/MNMH8546

Urrútia, G., & Bonfill, X. (2010). PRISMA declaration: A proposal to improve the publication of systematic reviews and meta-analyses. *Medicina Clinica*, *135*(11), 507-511. https://doi.org/10.1016/j.medcli.2010.01.015

Vásquez-Rocca, L. (2024). Comunicación científica en Twitter. Autoría, función y estructuras prototípicas de académicos en Chile. *Galáxia (São Paulo)*, *49*, e66109. https://doi.org/10.1590/1982-2553202466109

Velarde-Camaqui, D., Viehmann, C., Díaz, R., & Valerio-Ureña, G. (2024). Características de los videos que favorecen el engagement de los divulgadores científicos en TikTok. *Revista Latina de Comunicación Social*, *82*, 1–18. https://doi.org/10.4185/rlcs-2024-2232

Vizcaíno-Verdú, A., De-Casas-Moreno, P., & Contreras-Pulido, P. (2020). Divulgación científica en YouTube y su credibilidad para docentes universitarios. *Educación XX1*, *23*(2). https://doi.org/10.5944/educxx1.25750