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# Science communication approaches of universities: An examination of dialogue and participation models on social media

## *Üniversitelerin bilim iletişimi yaklaşımları: Sosyal medyada diyalog ve katılım modelleri üzerine bir inceleme*

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## Abstract

*This study examines the science communication practices of university science communication offices in Türkiye on Instagram. A total of 592 posts were coded through content analysis based on the most recent posts of 32 offices with active accounts in December 2025. The coding was conducted at three levels: (i) content type, (ii) science communication model (deficit/information transfer, dialogue, participation), and (iii) contextual embeddedness (place and target audience). The findings show that the visible content is concentrated mainly in the genres of "expert opinion/conceptual explanation" and "institutional announcement", while activities such as Science Cafés are often framed as instruments of institutional visibility rather than interactive engagement. Overall, 69.4% of the posts correspond to a one-way information-transfer model, whereas dialogue-oriented (11.0%) and participation-oriented (19.6%) frames remain limited. The frequent omission of the target audience suggests that the public is constructed as a homogeneous and abstract recipient, whereas concrete groups such as young people and farmers are named more often in dialogue and participation-oriented content. Spatially, posts are presented mainly on campus (45.3%) or without a specified setting (40.2%), while off-campus venues such as municipal spaces, cafés, and schools remain limited. Overall, the study suggests that science communication should be understood as a practice shaped by content, place, target audience, and communication model, and indicates that universities are underutilizing the dialogic and participatory potential of social media.*

**Keywords:** *Science communication, science cafe, deficit model, participation model, dialogue model, participatory communication*

## Öz

*Bu çalışma, Türkiye'deki üniversitelerin bilim iletişimi ofislerinin Instagram platformu üzerinden yürüttükleri bilim iletişimi pratiklerini incelemektedir. Aralık 2025'te aktif hesabı bulunan 32 ofisin her birinin güncel gönderileri derlenerek toplam 592 paylaşım nitel ve nicel içerik analiziyle kodlanmıştır. Kodlama; (i) içerik türü, (ii) bilim iletişimi modeli (bilgi aktarımı/eksiklik, diyalog, katılım) ve (iii) bağlamsal boyut (mekân ve hedef kitle) katmanlarında yürütülmüştür. Bulgular, görünür içeriğin büyük ölçüde "uzman görüşü/kavramsal açıklama" ve "kurumsal duyuru" türlerinde yoğunlaştığını; Bilim Kafe gibi etkinliklerin ise çoğu zaman etkileşimli bir süreçten ziyade kurumsal görünürlük olarak temsil edildiğini göstermektedir. Paylaşımların %69,4'ü tek yönlü bilgi aktarımı modeline uymakta; diyalog (%11,0) ve katılım (%19,6) odaklı çerçeveler sınırlı kalmaktadır. Hedef kitlenin çoğunlukla belirsiz bırakılması, kamunun homojen ve soyut bir alıcı olarak kurgulandığına işaret ederken; somut grupların (gençler, çiftçiler vb.) daha çok diyalog ve katılım içeriklerinde adlandırıldığı görülmektedir. Mekânsal olarak paylaşımlar ağırlıkla kampüs içinde (%45,3) veya mekânı belirtilmeden (%40,2) sunulmakta; belediye mekânları, kafeler, okullar gibi kampüs dışı alanlar sınırlı kalmaktadır. Çalışma, bilim iletişiminin içerik, mekân, hedef kitle ve iletişim modeli tarafından şekillenen bir pratik olarak kavramsallaştırılması gerektiğini vurgulamakta; üniversitelerin sosyal medyanın diyalojik ve katılımcı potansiyelini yeterince kullanmadığını göstermektedir.*

**Anahtar Kelimeler:** *Bilim iletişimi, bilim kafe, bilgi eksikliği modeli, katılım modeli, diyalog modeli, katılımcı iletişim*

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## Introduction

Especially over the last three decades, science communication has tried to move beyond a simple assumption that public trust and public understanding would naturally follow if experts explained the facts clearly enough (Dominguez Lacasa & Mietzner, 2025). Public responses to science are shaped by experience, identity, organizational credibility, and the ways knowledge is embedded in everyday life, not merely by information deficit (Irwin & Wynne, 2003; Wynne, 1992). As a result, the field has increasingly valued dialogue, deliberation, and participation, with universities, museums, and research funders adopting the language of engagement as an organizational norm rather than an option (Bucchi & Trench, 2014; Rowe & Frewer, 2005). Digital platforms increasingly offer practical tools that facilitate active audience participation (Hu et al., 2022), but the fact that engagement has become the dominant aspiration does not mean it has become the dominant practice.

University science communication, in particular, has evolved from an ad-hoc endeavor driven by individual academics to an organizational function tied to governance, resources, and institutional strategy. While the formalization of these activities is evident through new policies and dedicated resource allocation, there is a significant lack of understanding regarding how this institutionalization reshapes communication practices and where these functions are precisely situated within the academic structure (Entradas et al., 2024).

Türkiye provides a setting to observe these dynamics because science communication has recently been scaled up as a coordinated project. In early 2025, the Council of Higher Education (YÖK) launched a nationwide science communication initiative under the banner of "Bilim İletişimi Ofisi" (Science Communication Offices) and promoted "Bilim Kafe" (Science Café) as a signature format for universities (Yükseköğretim Kurulu, 2025). For the first time, science communication is being established as a formal responsibility within the university structure. This development is significant because it moves the practice beyond individual initiatives and places it within the realm of institutional governance, making it a matter of visibility and accountability. However, this initiative is not without tension. It promises to make academic knowledge socially accessible while simultaneously invoking the logics of corporate branding, in which visibility and positive organizational representation become ends in themselves.

This study examines that tension through the digital traces universities produce while communicating science. The new initiative signals a shift from formal lecture spaces toward everyday venues, from one-way dissemination toward conversation, and from academic authority toward a more approachable public presence. This promise is visible not only through events themselves, but through the way universities document them on social media through images, captions, and acknowledgements. Generally, communication is treated as the record of an event, but it also shapes who the event is imagined for, what kind of interaction is considered appropriate, and which publics are recognized as relevant.

Science communication models enacted by universities are not only a matter of message style. They are also materially and socially situated. An event announced for a campus auditorium presumes one kind of audience and one kind of authority; a conversation staged in a café, a municipal facility, a school, or a care home implies another. Similarly, the public being addressed is crucial; it is shaped by who is invited or included, and by the communicative posture adopted toward them (as listeners, as questioners, or as co-producers). Where an encounter takes place and who it is addressed to are not incidental details but signals of the underlying communication model. A campus event aimed at an unnamed public tends to reflect a deficit-oriented, expert-centered approach, while events held in more open, non-institutional spaces and addressed to clearly named publics tend to reflect the inclusivity associated with dialogue and participation (Bucchi & Trench, 2014; Irwin & Wynne, 2003). This is why venue and audience are treated as part of the communication

model itself, not just background details, and why they form one of the central dimensions of this study's analytical framework. The guiding question of this study is not simply whether universities post about science; it is which publics they conjure, in which places, and through which communicative arrangements.

## Literature Review

### Science communication paradigms and the rise of engagement

Science communication is defined as the use of tailored activities and media to foster a personal relationship with science, specifically by encouraging reactions such as interest, enjoyment, and understanding (Burns et al., 2003). Concerns about the relationship between science and the broader public have existed as long as science itself has been a distinct social institution; yet it was in the latter half of the twentieth century that these concerns became the subject of systematic academic study and formal policy intervention (Gregory & Lock, 2008). This period coincided with large-scale public scientific projects and geopolitical rivalries that dramatically raised the stakes of public understanding of and support for science.

The historical evolution of science communication is characterized by three dominant paradigms: science literacy, public understanding of science, and science and society (Bauer et al., 2007). Each of these paradigms emerged as a response to the perceived shortcomings of its predecessor, reflecting a gradual but significant shift in how the relationship between scientific expertise and public knowledge has been understood and practiced. In its early stages, the field was governed by the deficit model, which posited that low levels of public engagement were the result of significant gaps in scientific knowledge. The prevailing logic suggested that by addressing these deficits and increasing scientific literacy, the public would inherently become more supportive of and engaged with scientific endeavors (Grant, 2023). This approach prioritized the dissemination of scientific data and methodology as the primary basis for public understanding. Under this paradigm, scientists are positioned as the exclusive authorities on valid knowledge, while the general population is characterized by a fundamental lack of comprehension (Nerghes et al., 2022).

Empirical evidence has shown that the mere dissemination of facts is insufficient to bridge the gap between science and the public. Consequently, the focus has shifted toward dialogue-based strategies. Under this model, the emphasis is on establishing a two-way exchange of information and perspectives. This model recognizes that non-experts often hold valuable insights capable of informing both scientific research and the development of public policy (Nerghes et al., 2022). Scientists and scientific organizations are encouraged to understand the concerns and informational needs of different social groups to align their technical goals with broader societal priorities (Metcalfe, 2019). Dialogue-based communication is supported by a diverse array of media, including interpersonal speech, email, and social platforms (VanDyke & Lee, 2020). While the dialogue model prioritizes mutual listening and interaction, it is distinct from full-scale participation, as the primary goal remains the communicative exchange rather than the direct involvement of the public in scientific decision-making (Reincke et al., 2020).

Over time, the dialogue model has evolved into a more dynamic and participatory framework. Today, public engagement with science serves as an umbrella term encompassing every touchpoint between researchers and society. This interaction is no longer confined to traditional methods, such as media appearances or science festivals, but instead includes active roles like citizen science, where the public acts as a primary subject in the scientific process. At the most advanced stage of this transformation, a new community-based research culture is emerging, where local communities themselves catalyze scientific inquiries to address their specific needs (Potochnik & Jacquart, 2025).

As science communication increasingly prioritizes community needs, science cafés have

emerged as a primary tool for putting these participatory theories into practice. They serve as transparent discussion platforms that facilitate a dialogue between academic expertise and the general public, providing a space where both parties can freely exchange ideas (Childers et al., 2022). The format has traceable roots in informal science exchange in coffeehouses and public salons dating back to the seventeenth and eighteenth centuries (Gonçalves, 2000; Pennell, 2003; Secord, 2007), while the contemporary science café movement emerged specifically in the late 1990s from the Café Philosophique tradition initiated by Marc Sautet in Paris in 1992, with the first Café Scientifique launched in Leeds in 1998 (Grand, 2015; Nielsen et al., 2015).

The science café model moves scientific debate out of the university and into the community. By using a non-academic format, these gatherings encourage people to learn and share ideas in a relaxed social atmosphere (Bagnoli & Pacini, 2011). Bagnoli and Pacini (2011) refer to these as "upside down" conferences because the traditional hierarchy is reversed. Instead of a scientist leading a lecture, the audience sets the agenda with their inquiries. This repositioning allows experts to engage with the public as guests in a common social space (Dallas, 2006). Today, the most tangible example of this global network's institutionalization is found in Canada, where numerous universities and public institutions have established a systematic framework by disseminating these events across urban spaces. Furthermore, these scientific gatherings are documented in digital archives, ensuring they remain accessible to the wider public (Navid & Einsiedel, 2012).

**Science Communication in Universities**

Universities have served as central institutions for the production and transmission of knowledge since the medieval period, but their relationship with public communication of science has changed over time. As universities diversified their disciplines through the Renaissance, the Scientific Revolution, and industrialization, they gradually shifted from inward-facing scholarly communities toward outward-facing research institutions with growing public relevance (Earnshaw, 2017). Over the past six decades, this outward orientation has professionalized into a distinct science communication function, shaped by demands for public accountability, democratic engagement, and organizational reputation (Davies, 2021; Gascoigne & Metcalfe, 2017; Trench, 2012).

Modern universities are under constant pressure to compete for talent and funding, a reality that has forced them to behave more like goal-directed organizational actors (Krücken, 2020). This shift has made science communication more professional, usually by placing it within broader public relations or organizational communication frameworks. Working within these frameworks, practitioners act as mediators who must balance the internal needs of the faculty with the external demands of managing a university's reputation. Despite this growth, central communication offices often treat science communication as a secondary concern, focusing on the logistics of orchestration rather than the actual execution of the work. This suggests a missed opportunity for universities to move past simple self-promotion and take on a more strategic role in building a national science culture through public dialogue (Entradas et al., 2023; Sataøen & Lövgren, 2024).

University-based communication functions as a multidimensional exchange that links internal scholarly collaboration with external stakeholders like industry and policymakers. Rather than just translating technical content for lay audiences, the goal is to build literacy and foster informed public engagement. Current thinking has moved toward a dialogue-based model, where scientific output is integrated directly into the cultural and political landscape (Koechlin et al., 2025; Leach, 2012; Rodrigues et al., 2025). In practice, the methods used to achieve this are broad, encompassing traditional public talks and articles alongside modern social media engagement. These initiatives rely on participatory research and the co-creation of dissemination formats, where the target audience is directly involved in shaping how information is

shared (Harfouche et al., 2021; Lafetá Pinto Santos et al., 2024).

The core objectives of university science communication focus on making technical ideas accessible and interesting to a wide range of people (Greig et al., 2024; Koechlin et al., 2025; Yeo et al., 2015). This builds the trust and credibility that the scientific community needs to maintain its relationship with the public (Dasgupta et al., 2025). On a broader scale, this work informs policy decisions and gives more weight to societal debates on scientific issues (Ben Shoushan & Yavetz, 2025; Rodrigues et al., 2025). There is also the long-term benefit of inspiring students to enter research careers, effectively securing the next generation of scientists (Dasgupta et al., 2025; Saraiva et al., 2025).

**Scientific Engagement on Social Media**

The scientific community is transitioning from traditional broadcasting toward two-way engagement, a shift made possible by the interactive features of social media (Hara et al., 2019). Using social platforms helps bridge the gap between academia and society and makes scientific work more impactful and socially significant (Latimore & Lowry, 2022). Through these platforms, audiences are repositioned as co-producers of information rather than simple consumers. This repositioning grants users a sense of agency that facilitates a broader involvement in the political and regulatory discussions surrounding science (Miah, 2017). Scientific engagement now takes place across various social media platforms such as X, Instagram, YouTube, TikTok, and Reddit (Chen et al., 2021; Habibi & Salim, 2021; Hara et al., 2019; S. Yang et al., 2022).

Social media platforms have fundamentally changed how research is shared by enabling the immediate dissemination of scientific work to a global audience, which in turn fosters more collaborative and interactive scholarly environments (Abou-Ismail et al., 2024). This digital connectivity significantly amplifies the reach and societal impact of research, especially when it integrates the efforts of diverse public groups through crowdsourcing and citizen science (Habibi & Salim, 2021; Latimore & Lowry, 2022). Beyond simply increasing visibility, these platforms empower the public to participate in scientific governance and help individuals build the self-assurance needed to engage with complex issues (VanDyke & Lee, 2020). Over time, these interactions have given rise to more reciprocal forms of learning, where experts and publics work together to produce scientific knowledge rather than simply transmit it (Nguyen & Diederich, 2023). Within this landscape, Instagram has emerged as a particularly significant platform for science communication, with its visual format supporting public engagement across diverse scientific fields (Camacho & Olmo, 2022; Caspari, 2022) and generating comparably high audience engagement (Martin & MacDonald, 2020). However, research suggests that Instagram communication tends toward broadcast-oriented dissemination rather than genuine dialogue (Vasquez-Guevara & Cvetkovic, 2025), making it a particularly relevant platform for examining the gap between participatory ideals and communicative practice.

Despite this global momentum toward dialogue and participation, the Turkish science communication landscape remains comparatively understudied. The field is still in an early stage of development nationally, with bibliometric evidence suggesting that peer-reviewed output on science communication in Turkey between 2010 and 2023 amounted to only 23 journal articles and 12 graduate theses, the majority of which focused on traditional media content (Kaygusuz, 2024). The studies that do exist have examined science communication policies (Ozdemir & Koçer, 2020), the social media practices of science centers (Haçikoğlu, 2023), and the communicative activities of university communication units more broadly (Suerdem et al., 2023). How the Science Communication Offices established under YÖK coordination enact these paradigms in practice, and whether their social media presence reflects the dialogic and participatory ideals that motivate the initiative, remain open questions that this study sets out to answer:

RQ1: How do University Science Communication Offices in Türkiye operationalize and categorize their science communication practices through specific content types on Instagram?

RQ2: To what extent do the communication models enacted by these offices reflect the traditional deficit model versus modern dialogue or participatory frameworks?

RQ3: How are the physical venues and intended publics of science communication encounters represented and conjured within the institutional social media narrative?

## Methodology

### Research design

This study examines how university Science Communication Offices in Türkiye operationalize and represent science communication practices on social media. The study uses a qualitative and quantitative content analysis of Instagram posts published by official Science Communication Office accounts affiliated with Turkish universities. Content analysis is an effective method for identifying significant connections within a dataset by categorizing and measuring specific themes. This process relies on either inductive or deductive reasoning to systematically examine these categories and reveal underlying patterns in the information (Vears & Gillam, 2022).

Instagram was selected because it is the primary public-facing platform where these offices record events, announce activities, and represent their relationship with the public through images, and captions. In the Turkish context, Instagram is both the most widely used social media platform, with 58.4 million users, and the platform on which users spend the most time, averaging 32 hours and 36 minutes per month, surpassing all other platforms (We Are Social, 2025). Instagram has experienced significant growth in science communication across various fields (Caspari, 2022). Dynamic and experimental content on Instagram, as well as participatory and dialogue-oriented formats, stimulate higher levels of engagement (Habibi & Salim, 2021).

### Sample and data collection

The sample includes 32 universities for which an identifiable, active Instagram account dedicated to science communication activities was available at the time of collection. This approach constitutes a census rather than a random sample, as it includes all universities that met the inclusion criterion of maintaining an active, identifiable Science Communication Office account on Instagram at the time of data collection. For each university account, the most recent 30 posts were collected to ensure comparability across institutions. Given that many offices were newly established at the time of data collection, a substantial proportion of accounts contained fewer than 30 posts in total; in such cases, all available posts were included. The threshold of 30 posts thus reflects both a standardization decision and the practical constraints of an emerging institutional landscape. Such focused corpora are consistent with Instagram content analysis research that prioritizes interpretive depth over volume (Rosa & Soto-Vásquez, 2022). Across the 32 accounts, 592 posts were included in the dataset. Data collection was conducted in December 2025.

### Unit of analysis and coding

The unit of analysis is a single Instagram post. Posts were coded using an interpretive codebook that combines deductive categories derived from science communication theory, especially the distinction between deficit-oriented dissemination and engagement-oriented approaches, and inductive refinements grounded in recurrent patterns observed in the sample.

Coding relied on the caption's narrative content and the visual scene (e.g., poster, event photo, organizational announcement). The posts were treated as potentially multi-functional: a single

post can simultaneously announce an event, perform institutional legitimacy, and signal an engagement stance. For that reason, the content-type coding was designed to allow multiple codes per post where analytically justified.

To strengthen transparency and assess intercoder reliability, a subsample of the dataset was independently coded by two researchers. Intercoder agreement was calculated using Cohen's Kappa, yielding a coefficient of $\kappa = 0.83$, which indicates very high agreement between coders and demonstrates the reliability of the coding scheme (Lombard et al., 2002).

The analysis relies on three linked coding layers: (1) content type (what is being posted), (2) communication model (how science–public relations are imagined), and (3) contextual situatedness (where and for whom the encounter is staged). For content type, each post was assigned to one primary category. "Science event announcements, posters, and invitations" captured posts that function mainly as invitations or announcements, typically marked by future dates and times, an explicit venue reference, a speaker name without reported outcomes, and poster-like visuals. "Science talk and discussion archives" referred to posts indicating that a talk took place, usually naming the topic and speaker and signaling interaction, yet without centering institutional appreciation or extensive photographic documentation. "Post-event reporting" included posts that documented a completed event through photographs, acknowledgements, participation notes, and brief summaries. "Expert perspectives and conceptual explanations" covered short explanatory formats such as concept series, faculty Q&A segments, and recurring reels or episodes built around explanation. "Dissemination of research, projects, and academic milestones" included posts foregrounding research outputs and achievements, such as grants, awards, rankings, citations, lab or project updates, and external recognition. "Community outreach and social engagement" captured outreach activities in which publics were engaged through visits, workshops, demonstrations, screenings, museum tours, school-based activities, or other field encounters that were not framed primarily as a science café. Finally, "organizational communications" included launch announcements, administrative congratulatory messages, memorial posts, official protocol-related messages, and office-level institutional milestones.

For the communication model, posts were coded according to the kind of science–public relationship implied by their framing, venue cues, and forms of address. The codebook operationalized three models. In "deficit / one-way information transmission", science is presented as knowledge delivered by experts to an audience positioned primarily as recipients; posts emphasize correct knowledge, awareness raising, or informing, with few or no cues of reciprocal exchange. Common indicators include lecture-like framing, an authoritative tone, and an absence of invitations to contribute beyond attendance. In "dialogue model", the encounter is framed as conversational, reciprocal, and question-driven; indicators include explicit reference to discussion and Q&A, invitations to reflect together, direct address that positions publics as interlocutors, and captions that narrate interaction rather than mere presence. In "participation / engagement", publics are positioned as active contributors to shaping the encounter or producing knowledge, for example through hands-on making, workshops, citizen input, co-creation, or the recognition of community expertise as a resource rather than a target of education (Burns et al., 2003; Devenport et al., 2021; Hafferty et al., 2024). Table 1 presents representative coding examples for each of these three models.

To connect communication models to material conditions, posts were also coded for venue type and addressed publics whenever these could be inferred from caption text and/or visuals. Venue type was coded using a minimal set of categories: on-campus university space; semi-public civic space, commercial or public leisure space, field sites, community or rural sites, and media or broadcast spaces. When the venue was not explicitly stated, it was coded as "unspecified" rather than inferred. Target publics were coded based on explicit naming and contextual cues, with categories including

students, general public or citizens, families, children and youth as non-university minors, elderly residents, farmers and agricultural stakeholders, professional groups or associations, and mixed or unspecified audiences.

***Table 1. Illustrative Coding Examples for the Three Communication Models***

| Communication Model | Representative Post (Summary) | Coding Rationale |
|---|---|---|
| Deficit / one-way information transmission | A post announcing that a faculty member's research project had been awarded national funding, presenting the project title, budget, and duration. | Information is delivered in one direction; the post contains no invitation to engage, ask questions, or participate, and the public is positioned solely as an audience for institutional achievement. |
| Dialogue | A post inviting the public to a Science Café session framed as an opportunity to learn and share together, addressed separately to children, families, and producers. | The caption frames the encounter as reciprocal and uses direct, inclusive address that positions the public as an interlocutor, though without indicating that participants contributed to producing an outcome. |
| Participation / engagement | A post announcing a Science Café session described as a participatory approach to scientific awareness through Forum Theatre. | The format explicitly positions attendees as co-producers of the encounter rather than passive observers, consistent with the participation model's emphasis on active contribution to shaping the communicative event. |

Crucially, "public" was treated not as a demographic descriptor but as a discursive construction: the legitimate addressee is produced through institutional cues and communicative positioning, and is therefore part of the practice being analyzed rather than merely its background context.

## Findings

The findings present a systematic analysis of how university science communication offices translate institutional mandates into visible communication practices on social media. Based on the average of each account's individual activity levels (total posts divided by active months), the collective mean was identified as 7.06 posts per month.

To identify the dominant patterns through which universities operationalize science communication on social media, all posts in the dataset were first coded according to their primary content orientation. Table 2 presents the distribution of posts across seven content categories, offering a quantitative overview of how science communication is publicly represented by university science communication offices.

***Table 2. Classification of Science Communication Content (N=592)***

| Content Type | Number of Posts | Proportion of Total Content (%) |
|---|---|---|
| Event Announcements, Posters, and Invitations: Promotional materials designed to invite the public and generate interest in up- | 91 | 15.4 |
| Talk and Discussion Archives: Documentation of completed sessions, focusing on the key dialogue and presentations delivered. | 88 | 14.9 |
| Post-Event Reporting: Comprehensive summaries featuring photographic evidence, acknowledgments, and impact over- | 57 | 9.6 |
| Expert Perspectives and Conceptual Explanations: Multimedia content or video series featuring academic insights and the clarification of complex scientific concepts. | 190 | 32.1 |
| Dissemination of Research, Projects, and Academic Milestones: Content aimed at | 69 | 11,7 |
| Community Outreach and Social Engagement: Field-based activities targeting specific demographics such as schools, rural | 60 | 10.1 |
| Organizational Communications: Official updates regarding the establishment of new units, mandates from the Council of Higher Education (YÖK), commemorations, | 165 | 27.9 |

The distribution presented in Table 2 reveals a highly uneven content landscape, dominated by explanatory and organizational forms of communication rather than event-centered or participatory practices. The most prevalent categories are "expert perspectives" and "conceptual explanations", which account for nearly one-third of all posts (32.1%).

Organizational communications constitute the second largest category (27.9%). Science Café–related posts (announcements, talk archives, and post-event reporting) account for approximately 39.9% of the dataset. The emphasis remains on visibility rather than on the communicative substance or outcomes of the encounters. Community outreach and social engagement activities represent 10.1% of the total content. Given the centrality of "public engagement" in policy discourse, this relatively modest proportion indicates that direct interaction with non-academic publics remains limited.

Table 3 summarizes the distribution of posts across the three communication models, revealing the underlying assumptions that structure organizational science communication practices.

***Table 3. Distribution of Posts by Science Communication Models (N=592)***

| Communication Approaches in Science Communication | Number of Posts | Proportion of Total Content (%) |
|---|---|---|
| Information Dissemination / One-way Transmission | 411 | 69.4 |
| Dialogue | 65 | 11.0 |
| Participatory / Engagement | 116 | 19.6 |

The distribution in Table 3 demonstrates a strong dominance of one-way information transmission within university science communication on social media. Nearly seven out of ten posts (69.4%) conform to an information dissemination model, in which scientific knowledge is framed as something delivered by experts to an audience positioned primarily as recipients.

Dialogic communication constitutes a relatively small portion of the dataset. Posts coded as dialogue-oriented account for only 11.0% of total content, suggesting that explicit framing of science communication as conversational, reciprocal, or question-driven remains marginal. Participatory or engagement-oriented posts represent 19.6% of the total, indicating a modest but visible effort to involve publics more actively in science-related activities.

The analysis further examines how target audiences are articulated across different communication models. Table 4 presents the distribution of addressed publics across communication models, highlighting the extent to which audience specification varies between deficit-oriented, dialogic, and participatory practices.

The results demonstrate an asymmetry in how target audiences are articulated across communication models. Posts coded under the deficit model mostly address an unspecified public, with more than three quarters of such posts lacking any explicit indication of whom the communication is directed toward. In these cases, science is presented as universally relevant but socially unembedded, with audiences implicitly imagined rather than concretely named. By contrast, dialogic posts are more likely to specify their intended publics. Within this category, the "general public" emerges as the most frequently named audience, followed by university students and youth groups.

***Table 4. Distribution of Target Audience by Science Communication Models (N=592)***

| Communication Model | University Students | General public | Youth | Elderly | Farmers | Graduates | Unspecified/Implicit Public | Total |
|---|---|---|---|---|---|---|---|---|
| Deficit Model | 42 | 33 | 2 | 0 | 0 | 1 | 327 | 405 |
| Dialogue Model | 26 | 30 | 9 | 0 | 0 | 0 | 0 | 65 |
| Participatory Model | 34 | 22 | 11 | 3 | 5 | 5 | 42 | 122 |
| Total | 102 | 85 | 22 | 3 | 5 | 6 | 369 | 592 |

Table 5 presents the distribution of science communication practices by venue type across the dataset. The distribution reveals a concentration of science communication practices within university-controlled environments. Nearly half of all posts (45.3%) locate science communication activities explicitly on campus. A second important finding concerns the high proportion of posts coded as unspecified venue or no venue (40.2%).

***Table 5. Distribution of Science Communication Practices by Venue Type (N = 592)***

| Venue Type | Number of Posts | Proportion of Total Content (%) |
|---|---|---|
| On-campus university spaces | 268 | 45.3 |
| Semi-public civic spaces (municipal facilities, cultural centers, public libraries) | 28 | 4.7 |
| Commercial / leisure spaces (cafés, shopping malls, hotels) | 14 | 2.4 |
| Educational field sites (primary or secondary schools/ high schools) | 22 | 3.7 |
| Media and digital broadcast spaces (radio studios, podcast studios) | 22 | 3.7 |
| Unspecified venue/ No venue | 238 | 40.2 |
| Total | 592 | 100 |

Venues that symbolically and practically signal openness to broader publics remain marginal. Semi-public civic spaces such as municipal facilities, libraries, and cultural centers account for only 4.7% of posts, while commercial or leisure spaces constitute just 2.4%. Educational field sites, including primary/secondary/high schools, represent 3.7% of the dataset, indicating limited outreach beyond the university's immediate academic constituency.

**Discussion and Conclusion**

This study set out to examine how newly established university science communication offices translate the normative promise of engagement into everyday communication practices on social media. Explanatory content, organizational announcements, and abstracted expert narratives occupy the largest share of posts, while dialogic and participatory practices appear as secondary layers rather than organizing principles. This finding reflects earlier critiques in science communication scholarship, which highlight that adopting the language of engagement does not necessarily transform underlying communicative logics (Irwin & Wynne, 2003).

The prevalence of deficit-oriented communication becomes particularly visible when examining how publics are addressed. Posts that leave audiences unspecified overwhelmingly coincide with one-way transmission models, reproducing an abstract notion of the public as a homogeneous recipient of knowledge. Publics are neither homogeneous nor passive; they are plural, situational, and differently positioned in relation to scientific knowledge and its applications (Heiberger et al., 2026; Jacques-Aviñó et al., 2022). In contrast, dialogic and participatory posts are more likely to name concrete publics such as youth, elderly residents, farmers, or local communities, thereby acknowledging differentiated social positions and forms of expertise. Audience specification thus emerges as more than a descriptive feature; it functions as an indicator of communicative reflexivity. Naming publics performs interpretive work by signaling whose presence is anticipated, whose knowledge is recognized, and what forms of interaction are considered legitimate. It is also notable which publics are absent from this picture altogether. Civil society organizations, policymakers, and industry stakeholders did not emerge as a recurring pattern in the dataset. These are precisely the kinds of issue-publics and expert publics whose engagement would signal a more genuinely dialogic orientation (O'Connor et al., 2019; Z. Yang, 2022), but current organizational communication does not appear to engage with these constituencies as recognized publics.

Spatial patterns reinforce this interpretation. Nearly half of all posts situate science communication within on-campus settings, while venues that symbolically open science to broader publics remain marginal. Informal, non-institutional spaces have been shown to reach underserved audiences, foster dialogue, and connect science to lived experience in ways that formal institutional settings find difficult to replicate (Doroh & Streicher, 2021; Rosin et al., 2023; Tyrrell et al., 2026). This spatial abstraction aligns closely with deficit-oriented models, where knowledge is imagined as universally applicable and socially unembedded. When science communication does move into non-university spaces, it more frequently adopts dialogic or participatory postures, suggesting that place itself structures communicative possibilities (Beets et al., 2025; Rodríguez Batista, 2026). The concentration of activity within campus settings suggests that, despite the rhetoric of public engagement, the offices' communicative orientation remains largely inward-facing, addressing audiences already affiliated with the university rather than the broader publics that science communication initiatives are nominally designed to reach. This finding resonates with international research on campus-based public engagement, which similarly suggests that university settings, even when nominally open to the public, retain barriers that shape who chooses or is able to attend (Rawlinson et al., 2021).

The findings show that Turkish universities' science communication practices on social media reflect information dissemination rather than the

emphasis on dialogic engagement. This pattern is consistent with recent large-scale European evidence. A comprehensive study of all Swiss higher education institutions' social media communication over an 18-year period found that content remained predominantly self-referential, oriented toward organizational and teaching matters rather than substantive public engagement with research (Sörensen et al., 2023). Similarly, cross-national survey evidence from research universities in Germany, Italy, Portugal, and the UK shows that central communication offices remain focused on public relations and marketing functions oriented toward institutional visibility, with genuinely dialogic science communication activities more likely to occur only at decentralized, departmental levels rather than through centrally managed channels (Entradas et al., 2024).

Despite the technical affordances of platforms like Instagram, the interactive potential of social media remains underutilized. Science Communication Offices appear to prioritize visibility, legitimacy, and organizational coherence over sustained engagement, effectively extending traditional public relations logics into the digital sphere. Science functions largely as content that supports this visibility agenda, rather than as the basis for an ongoing exchange with publics. This does not mean the two cannot coexist within the same communication strategy, but the balance observed across the dataset is heavily weighted toward the former. In terms of the typology proposed by Entradas et al. (2024), the offices examined function more like public relations units than like the dialogic science communication offices their name suggests. This does not imply that deficit-oriented communication is inherently flawed. As previous scholarship emphasizes, effective science communication is situational rather than universal, and hybrid models may be strategically appropriate depending on context and audience (Fooladi, 2020).

These findings carry implications for both science communication policy and practice. The YÖK initiative has succeeded in establishing a nationwide infrastructure for science communication within a remarkably short period, but infrastructure alone does not determine communicative orientation. Research consistently shows that universities with formal policies, guidelines, and strategic plans engage more actively and substantively with publics (Entradas et al., 2020, 2023), and that norms and incentive structures shape how communication priorities are set (Marcinkowski et al., 2014). The dominant pattern observed across the dataset suggests that without explicit guidance on what distinguishes science communication from public relations, offices are likely to default to the institutional visibility logics that already govern university communication more broadly (Entradas et al., 2023). A reorientation toward dialogue and participation would require policy incentives and evaluation criteria that measure the quality and reciprocity of science-public interaction, rather than reach and follower counts alone.

This study is not without limitations. Instagram posts are representations rather than direct observations of interaction; they show how universities choose to narrate science–society encounters, not necessarily how those encounters unfold offline. However, this representational layer is precisely what makes the analysis meaningful, as success is increasingly evaluated through such digital traces.

Future research could extend this analysis through comparative studies across countries, longitudinal tracking of institutional learning over time, a disciplinary mapping of content to examine which scientific fields receive greater visibility and whether communication models vary across disciplines, or ethnographic investigation of how communication decisions are made within Science Communication Offices. Such work could deepen our understanding of how engagement moves from aspiration to practice in contemporary academic institutions.

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***Ethical Approval:*** Ethical committee approval was not required for this study because the study was based solely on publicly available social media content and did not involve human or animal subjects.

***Informed Consent:*** Informed consent was not applicable because the study did not involve human participants.

***Data Availability:*** The data that support the findings of this study are available from the corresponding author upon reasonable request.

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