TOWARDS INCLUSIVE SCIENCE COMMUNICATION:
REFLECTIONS AND SUCCESSFUL ACTIONS

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CHAPTER 1:

MOTIVATION

The Future of Science Communication Must be Inclusive

Emily Dawson

I am often asked what I think the future of science communication will be. I always answer the same way. The future of science communication must be inclusive. Inclusion, equity and social justice are all complex, multifaceted and, as a result, contested political terms. These words can mean different things, to different people, in difference spaces, just like science. Common to most social justice perspectives is a recognition that inclusion efforts are about recognising, ameliorating and transforming the impacts of the structural inequalities that shape our societies, such as, but not limited to, racism, sexism, class discrimination, ableism, homophobia, transphobia, ageism and their intersections. And to recognise all this in science communication requires change.

The necessarily inclusive science communication of our future transforms what we mean by science and what we mean by communication. Assimilation is no longer the price paid for inclusion. Inclusive science communication understands the complexity of socio-political and cultural histories of power, of structural inequalities and whose forms of knowledge, whose practices, whose communities have and have not been valued and seeks to transform these patterns. It reframes everyone (not just dominant groups) as asset-rich. It makes space for agency. It supports people to be themselves and engage with science.

It recognises and meets people's needs in ways that mean they do not have to change who they are in order to engage with science. Its politics are explicit, not hidden, and they focus on inclusion, equity and social justice.

I believe the future of science communication is being hatched amongst groups of young girls co-creating software to support their fan-fiction practices around the latest pop star[1]. That it is being built in social housing neighbourhoods where communities run their own grassroots citizen science projects to collect data and lobby for change[2]. That it is dragged into being amongst activists campaigning for better maternal health outcomes for women from racialised minorities and those who fought to get PrEP trials underway in national health services[3] [4]. It happens in ordinary spaces online where people discuss the pandemic[5]. It happens in community-based youth groups where young people mix playing Minecraft with learning animation skills[6]. In other words, **that the future of science communication is already happening. Perhaps most importantly, that future is inclusive.** And if dominant mainstream science communication practices are to stay relevant and useful — whether in the mass media, museums, university research outreach or elsewhere — they too must change.

I have yet to meet any science communicators driven by a desire to reproduce social inequalities, but research shows that is what many science communication practices risk doing[7] [8] [9]. As a field it is crucial, therefore, that we rethink the underlying ideas that frame both science communication and the

1. Judd, S. (2017). How the tech sector could move in One Direction. Paper presented at the Webstock, Wellington, New Zealand/Aotearoa. https://www.sachajudd.com/one-direction
2. Knowle West Media Centre. (2015). The Bristol Approach to Citizen Sensing. Retrieved from Bristol: https://issuu.com/knowlewestmedia/docs/bristol_approach__citizen_sensing_a
3. Suarez, A. (2020). Black midwifery in the United States: Past, present, and future. Sociology Compass, 14(11), 1–12.
4. Weil, B., & Ledin, C. (2019). PrEP at the After/Party: The 'Post-AIDS' Politics of Frank Ocean's "PrEP+". Somatosphere: Science, Medicine and Anthropology. Retrieved from: http://somatosphere.net/2019/prep-at-the-after-party.html/
5. Pulido Rodríguez, C., Villarejo Carballido, B., Redondo-Sama, G., Guo, M., Ramis, M., & Flecha, R. (2020). False News around COVID-19 circulated less on Sina Weibo than on Twitter. How to overcome false information? International and Multidisciplinary Journal of Social Sciences, 9(2), 107–128. doi:10.17583/rimcis.2020.5386
6. Godec, S., Archer, L., & Dawson, E. (2021). Interested but not being served: Mapping young people's participation in informal STEM education through an equity lens. Research Papers in Education, 1–28. doi:10.1080/02671522.2020.1849365

concept of inclusion in order to develop meaningfully equitable and socially just practices. **Not all motivations behind science communication are informed by social justice perspectives — but they could be usefully reimagined with inclusion, equity and justice at their core.** The more we can learn together and reflect, the better positioned we will be to transform the field and, clearly, there is a lot to learn. In what follows I briefly outline some key concerns, with the hope that we might then be better able to radically reimagine alternatives that support meaningfully inclusive science communication.

Science, though everywhere, is not accessible for everyone

The pandemic has shown us all the urgent need for inclusive science communication. At the local, national and international levels, relationships between science and society have never seemed so crucial. From the mass media to government policies to conversations with neighbours, all our lives have been explicitly saturated with science in ways that most of us have likely not experienced before. At the same time, the pandemic has shone a light on the structural inequalities that fracture our societies, making the realities of the health, economic and political inequalities that divide our world impossible to ignore, even for those who have obscured or denied them. In the UK, for instance, where I live, data show that COVID morbidity and mortality are marked by 'race'/ ethnicity, social class and gender in ways that mirror exactly the pattern of who is excluded from science communication, engagement and education initiatives[10]. The COVID-19 pandemic, then, has demonstrated inescapably that science, though everywhere, is not accessible for everyone.

7. Bell, P., Lewenstein, B., Shouse, A., W., & Feder, M. A. (2009). Learning science in informal environments: People, places, and pursuits. Washington D.C.: The National Academies Press.
8. Canfield, K. N., Menezes, S., Matsuda, S. B., Moore, A., Mosley Austin, A. N., Dewsbury, B. M., Taylor, C. (2020). Science Communication Demands a Critical Approach That Centers Inclusion, Equity, and Intersectionality. Frontiers in Communication, 5(2). doi:10.3389/fcomm.2020.00002
9. Dawson, E. (2019). Equity, exclusion & everyday science learning: The experiences of minoritised groups. London and New York: Routledge.
10. White, C., & Nafilyan, V. (2020). Coronavirus (COVID-19) related deaths by ethnic group, England and Wales: 2 March 2020 to 10 April 2020. Retrieved from: https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/deaths/articles/coronavirusrelateddeathsbyethnicgroupenglandandwales/2march2020to10april2020

Whether you like it or not, science plays important roles in our societies. As the pandemic has repeatedly shown us, being able to access scientific information, to ask questions, to enjoy science, to laugh at science, to speak back to science, to use it and to contribute to it are powerful practices in our societies. Beyond the immediate, urgent call for inclusive science communication required by the pandemic, even more is at stake. The social, cultural, educational and political practices involved in science and society relationships are part of the many spaces where we learn to understand and navigate ourselves in relation to others. In these sorts of spaces, meanings are made, contested, reproduced and/or disrupted. And we make meanings about more than just science when we engage with the many different kinds of practices that make science 'public'. **We make meanings about whose knowledge counts, whose practices count and, ultimately, who counts in our societies.**

The politics of exclusive science communication

Science communication is political. Drawing on decades of research in science and technology studies we know science and society are mutually constituted[11 12]. From this perspective we can see how intermediary practices like those involved in science communication inevitably have their own political investments[13 14 15].

Science communication is not an inclusive field, whether you think in terms of practitioners or publics. If we look at the available data about audiences, visitors, participants or other involved publics, in the UK science communication remains

11. Jasanoff, S., & Kim, S.-H. (2015). Dreamscapes of modernity: Sociotechnical imaginaries and the fabrication of power. University of Chicago Press.
12. Latour, B. (1987). Science in action: How to follow scientists and engineers through society. Milton Keynes: Open University Press.
13. Lewenstein, B. V. (2015). Identifying what matters: Science education, science communication, and democracy. Journal of Research in Science Teaching, 52(2), 253-262. doi:10.1002/tea.21201
14. Orr, D., & Baram-Tsabari, A. (2018). Science and Politics in the Polio Vaccination Debate on Facebook: A Mixed-Methods Approach to Public Engagement in a Science-Based Dialogue. Journal of Microbiology and Biology Education, 19(1), 2-8.
15. Rasekoala, E. (2019). The seeming paradox of the need for a feminist agenda for science communication and the notion of science communication as a 'ghetto' of women's over-representation: perspectives, interrogations and nuances from the global south. Journal of Science Communication, 18(4), C07.

a set of resources and activities for privileged groups[16] [17] [18]. When we turn to look at the available data on publics in Spain, the picture is unsurprisingly similar. **If you live in a town, are rich and hold higher educational qualifications, you are much more likely to take part in science communication activities, whether in museums, festivals, attending science talks or similar activities (FECYT, 2021)[19]**.

We can see in these data **that science communication operates as an exclusive field.** That the exclusion operates at multiple levels is a core part of the field across different kinds of activities and is experienced extremely painfully by those at the sharp end of exclusive practices[20]. That these patterns remain, despite inclusion, equity and social justice being increasingly discussed may seem like a paradox. But, as I discuss below, this paradox is a core feature of the politics of mainstream science communication.

Making the politics of science communication explicit is crucial if we want to understand what happens in the field and how we might disrupt and transform it. At work within science communication are a number of what sociologist Yasmeen Narayan[21] [22] has called "common sense" political ideas or frameworks. These kinds of ideas are so frequently and widely used that they become assumptions, shaping what is accepted, expected and so on. In our case, these ideas include 'the public', 'science' and 'inclusion'. These common-sense political ideas organise and frame how we think and act within science communication, not least the name 'science communication', which itself implies so much. But while commonly used, such ideas demand careful reflection.

16. Dawson, E. (2019). Equity, exclusion & everyday science learning: The experiences of minoritised groups. London and New York: Routledge.
17. Ipsos MORI. (2011, 2014). Public Attitudes to Science 2011, 2014. Retrieved from London, UK.
18. Kantar. (2019). Public attitudes to science. Retrieved from London, UK.
19. Spanish Foundation for Science and Technology, FECYT. (2021). 10.a ENCUESTA DE PERCEPCIÓN SOCIAL DE LA CIENCIA Y LA TECNOLOGÍA – 2020. Available at: https://icono.fecyt.es/informes-y-
20. Dawson, E. (2019). Equity, exclusion & everyday science learning: The experiences of minoritised groups. London and New York: Routledge.
21. Narayan, Y. (2019). Intersectionality, nationalisms, biocoloniality. Ethnic and Racial Studies, 42(8), 1225–1244. doi:10.1080/01419870.2018.1518536
22. Narayan, Y. (2021). On histories of policing, academia, reconstruction and reparation. Retrieved from https://www.identitiesjournal.com/blog-collection/on-histories-of-policing-academic-reconstruction-and-reparation accessed 22.11.21

You can see the politics of science communication at play if you interrogate how exclusion and inclusion are framed within science communication. **Exclusion, as I argue below, is framed as a form of double deficit and the responsibility of the excluded[23]. Inclusion, meanwhile, is framed as a glorious crusade.[24].** Crucially, these two common-sense political frames operate to limit rather than support change in science communication. Interrogating these ideas helps us to understand the kinds of values that circulate within the politics of science communication and reimagine what is needed to develop a politics of inclusion.

Exclusion as a double deficit and inclusion as a crusade

Not taking part in science communication activities (whether at a museum, in a park, an after-school club, or watching a nature documentary in your own home), is often framed as a choice people make. This choice *not* to take part is understood quite judgementally as a mistake. The mistake is understood as the result of people first having the wrong attitudes; in science communication, this is framed as the mistake of disliking science in its various iterations and applications. This dislike or sense of alienation is often framed as the result of ignorance, of not knowing better[25]. In science communication we often talk of this idea as the deficit model, but despite this idea being critiqued for a long time, it persists with remarkable tenacity[26]. It seems to me that one reason for the continued role of deficit models comes from the implicit politics of the field. **The idea of deficits does a lot of work for maintaining the status quo and concomitant structural inequalities.**

The mistake (of not getting involved in science communication) is understood, secondly, as the result of people having the wrong behaviours. They don't do the

23. Dawson, E. (2019). Equity, exclusion & everyday science learning: The experiences of minoritised groups. London and New York: Routledge.

24. Sturgis, P., & Allum, N. (2004). Science in Society: Re-Evaluating the Deficit Model of Public Attitudes. Public Understanding of Science, 13(1), 55–74.

25. Dawson, E. (2018). Reimagining publics and (non)participation: Exploring exclusion from science communication through the experiences of low-income, minority ethnic groups. Public Understanding of Science, 27(7), 772–786. doi:10.1177/0963662517750072

26. Sturgis, P., & Allum, N. (2004). Science in Society: Re-Evaluating the Deficit Model of Public Attitudes. Public Understanding of Science, 13(1), 55–74.

'right' things, and what is typically meant here is that people do not always line up to take part in dominant cultural or political practices. Again, if they only knew how amazing a visit to a planetarium could be, surely they would change their minds! This is the second form of deficiency conjured up when we look at how exclusion is framed in science communication.

The key take-home here is that these attitudinal and behavioural deficits double up. **Crucially, they position the responsibility for participation, or 'fault', onto excluded people and their communities.** This is a deft sleight of hand. It removes responsibility from institutions, from practitioners, from researchers, from policymakers, from funders and places it firmly on the shoulders of people who are often most oppressed by structural inequalities and, in many ways, least able to change the status quo.

The next key common-sense political frame is embedded in how inclusion is framed in science communication. It is the idea of the crusade. This concept has its roots in the idea of the double deficit. It is premised upon the belief that, first, dominant forms of science communication are the ones that matter most (everything else is invisible or irrelevant). And second, that dominant forms of scientific knowledge matter most. In this set of assumptions, **science is seen almost as a vitamin**, as "especially good for you" as Joan Solomon put it[27]. And being involved in dominant forms of science communication practice operate then as, what Jim McGuigan has called, a form of "moral regulation"[28].

Framing exclusion as the result of deficiencies on the part of the excluded and inclusion as a righteous crusade on the part of those who are included prevents change and creates damaging practices. As Sara Ahmed[29] has argued, so-called inclusion practices too frequently work to protect established interests and the status quo. Similarly, as the research I have been involved with has shown, and as Gargi Bhattacharya[30], has argued, work on inclusion risks becoming more about opening up new markets than about meaningfully working alongside

27. Solomon, J. (2012). Science of the people: Understanding and using science in everyday contexts. New York and Abingdon: Routledge.

28. McGuigan, J. (1996). Culture and the Public Sphere. London and New York: Routledge.

29. Ahmed, S. (2012). On being included: Racism and diversity in institutional life. Durham and London: Duke University Press.

30. Bhattacharya, G. (2018). Rethinking racial capitalism: questions of reproduction and survival. London: Rowman and Littlefield, International.

minoritised and excluded groups. For instance, too often, tokenistic attempts to transform representational politics — for instance a temporary 'special' exhibition co-curated with a specific community group that does little to change the broader institution or exhibition practices — can all too easily become exercises in racial capitalism, benefitting institutions rather than the communities they claim to support[31].

The idea of the double deficit and the idea of the crusade work together to build a platform from which non-participation in science communication is almost unthinkable and can only be understood in this framework of common-sense political ideas as a mistake. The politics of these ideas are pernicious. Clearly everyone is involved in cultural, social, education and political practices. Furthermore, everybody is in a 'science and society relationship', whether it is good or bad, fascinating or irrelevant or somewhere in between, whether science is happening at, to, for, by, with or without them. And clearly framing certain groups as deficient and in need of saving for their own good is power play. These political frameworks make little to no room to understand, acknowledge or begin to disrupt and ameliorate the harm caused to particular people and communities by the structural inequalities that shape science communication and that, in turn, science communication reproduces[32].

Of particular note for those interested in the politics of science communication is how these common-sense political frameworks create a situation where inclusion is talked about, inclusion projects happen, but very little actually changes. These politics do not go unnoticed by the people they work to exclude. Connie, an Afro-Caribbean woman in her early sixties, worked with me a few years ago in a project involving several adult community groups in London. Her take on how inclusion in science communication operates was apt: "Everyone thinks the door is open, but it's not really, and that's probably because the people in charge are quite comfortable and don't want criticism or to have to change"[33]. This quote speaks directly to the politics of science communication. The common-sense

31. Leong, N. (2013). Racial capitalism. Harvard Law Review, 126(8), 2153–2226.

32. Dawson, E. (2019). Equity, exclusion & everyday science learning: The experiences of minoritised groups. London and New York: Routledge.

33. Dawson, E. (2018). Reimagining publics and (non)participation: Exploring exclusion from science communication through the experiences of low-income, minority ethnic groups. Public Understanding of Science, 27(7), 772–786. doi:10.1177/0963662517750072

political frameworks that frame exclusion as a double deficit and inclusion as a crusade structure whose practices and knowledges are framed as dominant, and disappear. In other words, who counts and who does not count. They are hegemonic concepts and practices. In that sense they are deeply political. Crucially, these ideas about inclusion and science communication limit our capacity for change. Built as they are on assumptions and structural inequalities that are in many ways baked into practice and theory, these common-sense political frameworks cannot challenge or seek to transform these inequalities, but rather reproduce them.

Mainstream science communication and the politics of cultural orthodoxy

Science communication is typically associated with a field of activities created for and by dominant groups in our societies. In the UK for instance, where I am from, science communication is measured in national studies by looking at the numbers of people who visit museums, science centres and planetaria, zoos, aquaria and botanic gardens, who attend science festivals, evening talks about science or similar events[34] [35]. Of course, **hat is measured is what is understood and thought to be important by the research community, policymakers and practitioners[36] [37] [38]. And in turn, what is recognised as important is what is measured.** This kind of closed loop system tells us a lot about the history of science communication practice, policy and research. Specifically, it tells us a lot about which spaces, content, behaviours and people matter and which do not.

The frameworks of common-sense political ideas that have been invoked in attempts at inclusive science communication operate within an 'orthodoxy of

34. Ipsos MORI. (2014). Public Attitudes to Science 2014. Retrieved from London, UK.

35. Kantar. (2019). Public attitudes to science. Retrieved from London, UK.

36. Dawson, E. (2019). Equity, exclusion & everyday science learning: The experiences of minoritised groups. London and New York: Routledge.

37. Gillborn, D., Warmington, P., & Demack, S. (2018). QuantCrit: education, policy, 'Big Data' and principles for a critical race theory of statistics. Race Ethnicity and Education, 21(2), 158–179. doi:10.1080/13613324.2017.1377417

38. Savage, M. (2010). Identities and social change in Britain since 1940: The politics of method. Oxford and New York: Oxford University Press.

approach' that is discernible in science communication practice and research[39]. That is, dominant institutions and practices, often supported by government — such as museums, universities, local or national government consultations — represent the most visible, 'high-brow', socially, culturally and politically valuable forms of science communication[40] [41]. This orthodoxy of approach, where dominant science communication practices are the most recognised, valued and rewarded, also works to obscure alternative activities — such as fan-fiction or community citizen science — that could be considered forms of science communication, as well as the kinds of knowledges and behaviours of those involved in less dominant forms of science communication. Thus, '**low-brow', 'popular', 'everyday' or 'ordinary' forms of science communication are less valued in the socio-cultural and political hierarchies of mainstream science communication.**

If we look closer, we find dominant science communication institutions and practices rehearse the same kinds of scientific content through remarkably similar representational and communicative techniques, working with the same kinds of dominant social groups (as trustees, employees and audiences/users) in a kind of institutional homology[42]. These, then, are the features of hegemonic science communication, or, to put it another way, what we might call mainstream science communication[43]. These dominant science communication practices are exclusive in the Bourdieusian sense; their value to dominant groups is premised on inaccessibility[44] [45] [46] [47]. Mainstream science communication revolves

39. Miles, A., & Gibson, L. (2016). Everyday participation and cultural value. Cultural Trends, 25(3), 151–157. Retrieved from http://dx.doi.org/10.1080/09548963.2016.1204043

40. Dawson, E. (2018). Reimagining publics and (non)participation: Exploring exclusion from science communication through the experiences of low-income, minority ethnic groups. Public Understanding of Science, 27(7), 772–786. doi:10.1177/0963662517750072

41. Dawson, E. (2019). Equity, exclusion & everyday science learning: The experiences of minoritised groups. London and New York: Routledge.

42. Powell, W. W., & DiMaggio, P. (1991). Introduction. In W. W. a. D. Powell, Paul J (Ed.). The New Institutionalism in Organisational Analysis (1–40). Chicago and London: The University of Chicago Press.

43. Finlay, S. M., Raman, S., Rasekoala, E., Mignan, V., Dawson, E., Neeley, L., & Orthia, L. A. (2021). From the margins to the mainstream: deconstructing science communication as a white, Western paradigm. Journal of Science Communication, 20(01), 1–12. doi:https://doi.org/10.22323/2.20010302

44. Bennett, T., Savage, M., Silva, E., Warde, A., Gayo-Cal, M., & Wright, D. (2009). Culture, class, distinction. Abingdon and New York: Routledge.

45. Bourdieu, P., & Johnson, R. (1993). The field of cultural production: Essays on art and literature. Cambridge: Polity Press.

around narrow views of which kinds of knowledge, which practices and which people matter most, reflecting and reproducing structural inequalities as a result[48] [49] [50]. Thus, as argued above, exclusion is no sad accident or a by-product of a few mistakes. It is a core feature of the politics of mainstream science communication[51] [52].

There is power in how inclusion in science communication is framed. And without sustained effort to disrupt and transform the politics of mainstream science communication that power will work to maintain the status quo.

How can we understand inclusive science communication?

How might we usefully understand what inclusive science communication involves? This question calls upon us to try to make sense not only of the disparate practices that make up science communication, but, at the same time, to try to understand what inclusion, equity and social justice entail. But if we understand science communication as a socio-cultural, politically situated activity, this complex task is clearly necessary

The ideas and languages of inclusion are used across different practices, fields of activity and countries. Unsurprisingly, their meanings and enactments

46. Bourdieu, P., & Passeron, J.-C. (1990). Reproduction in education, society and culture (R. Nice, Trans. Second ed.). London, Newbury Park CA, New Delhi: Sage.
47. Warner, M. (2005). Publics and Counterpublics. New York: Zone Books.
48. Ballo, R., Das, S., Dawson, E., Mignan, V., & Perronet, C. (2021). "The price we have to be willing to pay is ourselves": Discussing illusions of inclusion in science centres and museums. In B. Bevan & B. Ramos (Eds.). Theorizing equity in the museum: Integrating perspectives from research and practice (34–49). New York and Abingdon, UK: Routledge.
49. Dawson, E. (2019). Equity, exclusion & everyday science learning: The experiences of minoritised groups. London and New York: Routledge.
50. Finlay, S. M., Raman, S., Rasekoala, E., Mignan, V., Dawson, E., Neeley, L., & Orthia, L. A. (2021). From the margins to the mainstream: deconstructing science communication as a white, Western paradigm. Journal of Science Communication, 20(01), 1–12. doi:https://doi.org/10.22323/2.20010302
51. Bourdieu, P., & Johnson, R. (1993). The field of cultural production: Essays on art and literature. Cambridge: Polity Press.
52. Dawson, E. (2019). Equity, exclusion & everyday science learning: The experiences of minoritised groups. London and New York: Routledge.

change accordingly. The main features of inclusion — whether in science communication or other fields of practice — acknowledge how structural inequalities affect all our lives, not least how some people's actions are respected and valued (or not). Ideas about social justice, equality, equity and inclusion are political. As such, how these ideas are used, enacted and understood are often contested. Issues of social justice are inevitably multifaceted, constantly shifting and context dependent. What constitutes a meaningfully inclusive experience for one group might change from one week to the next, from topic to topic, from one space to the next, from country to country, and from local to national to international levels. As a result, asking exactly what makes something inclusive is inevitably a specific and contextual question, one that is always framed by shifting power geometries over space and time[53] [54].

Decades of research in science and technology studies had shown how science (understood broadly as scientific knowledges, communicates, practices and applications) is socio-culturally, politically and historically situated[55] [56] [57]. What this means in the context of inclusive science communication is that science, just like social justice, is political and cannot easily be divorced from context. And, that science too sits within a constantly changing landscape, with different emphases across time, space and power geometries[58] [59] [60] [61].

53. Hill Collins, P., & Bilge, S. (2016). Intersectionality. Cambridge Polity Press.
54. Massey, D. (1994). Space, Place and Gender. Cambridge: Polity Press.
55. Jasanoff, S., & Kim, S.-H. (2015). Dreamscapes of modernity: Sociotechnical imaginaries and the fabrication of power: University of Chicago Press.
56. Latour, B. (1987). Science in action: How to follow scientists and engineers through society. Milton Keynes: Open University Press.
57. Longino, H. E. (1990). Science as social knowledge: Values and objectivity in scientific inquiry. Princeton: Princeton University Press.
58. Hikuroa, D., Slade, A., & Gravley, D. (2011). Implementing Māori indigenous knowledge (mātauranga) in a scientific paradigm: Restoring the mauri to Te Kete Poutama. MAI review, 3(1), 9.
59. Longino, H. E. (1990). Science as social knowledge: Values and objectivity in scientific inquiry. Princeton: Princeton University Press.
60. Orthia, L. A. (2020). Strategies for including communication of non-Western and indigenous knowledges in science communication histories. Journal of Science Communication, 1–17.
61. Rasekoala, E. (2019). The seeming paradox of the need for a feminist agenda for science communication and the notion of science communication as a 'ghetto' of women's over-representation: perspectives, interrogations and nuances from the global south. Journal of Science Communication, 18(4), C07.

If we pull these pieces of the puzzle together, it helps us think through what inclusive science communication requires from us. A commitment to understand the nuances, contexts and socio-cultural political histories of science communication such that they can be reimagined in more equitable ways. A commitment to learning from one another in ways that are neither extractive nor seek to impose particular theories and practices imperialistically. Perhaps most importantly, a **commitment to centring equity, inclusion and social justice since it is clear that not doing so does not lead to any form of neutrality, but rather perpetuates inequalities.** From this perspective, with socio-cultural politics and values explicitly foregrounded in science communication rather than obscured, we can see that inclusive science communication likely follows no set recipe. Rather, multiple formulations, concepts and practices are likely to emerge, each appropriate to their own shifting landscape of socio-cultural politics and histories. As such, every case study, every data set, every concept and every national study helps us to better understand what inclusive science communication, in all its beautiful, contextual complexity, requires of us.

CHAPTER 2:

ANALYSIS

Identifying-overcoming exclusion

Ramón Flecha

New Societal Priority: Inclusive Science Communication

At the demand of society, science has started to reorient itself towards multi-stakeholder dialogue with social sectors and individuals that have not been included so far, thus achieving a higher level of excellence. The current European scientific research programme, Horizon Europe[62], has two major new priorities: *co-creation and societal impact*. **Co-creation is the co-creation of knowledge in dialogue between people in science and citizens, without exclusion. Social impact means that this knowledge improves the lives of all groups and individuals.** In this way, Article 27 of the United Nations' Charter of the Declaration of Fundamental Rights, from 1948, and *the right of everyone to share in scientific progress and its benefits*, is eventually put into practice.

62. For more information on the Horizon Europe Framework Programme for Research and Innovation, see: https://ec.europa.eu/info/research-and-innovation/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe_en

To be able to carry out this task with the quality that our society needs and deserves, one requirement is the development of policies, equipment and actions that enhance the dissemination and communication of science by groups and individuals who have traditionally been excluded. If their participation in the co-creation of scientific knowledge is a European priority, their role in its dissemination and communication cannot be relegated. If social impact is another priority, these groups and individuals are the ones who have the best knowledge of environments that need to be improved and who can most closely co-evaluate whether or not this is happening. The Horizon Europe programme (2021–2027) has specified the Key Impact Pathways (KIP) of social impact, and together with the Sustainable Development Goals (SDGs), and more specifically SDG 17, *Partnerships to achieve the goals*, 'Engaging EU Citizens' appears in Horizon Europe. **In this KIP, social impact is only achieved when the people and groups affected play an active role in the dissemination and communication of science, i.e. when inclusive science communication is achieved.** This publication focuses particularly on the SDGs that are more oriented towards vulnerable populations and, more specifically, in the sections referring to the four areas addressed here.

Criteria for the identification, selection and analysis of successful actions in inclusive science communication.

> The sectors in need of such a boost are many and diverse. In line with the UN's SDGs, this document analyses four of these areas, but in such a way that the analysis can be transferred and replicated to others. The four worked on here are: gender and sociocultural situation; cultural groups and groups at risk of social exclusion; disability; and LGBTI+ people. To identify the projects containing successful actions, the four identification, selection and analysis criteria that emerge from the consensus of the scientific community and especially from Horizon Europe have been followed: 1) Progressing towards inclusion; 2) Scientific evidence of social impact; 3) Replicability and sustainability; y 4) Bottom-up approach.

Moving towards inclusiveness

There have been many analyses of the exclusions suffered by various social groups, but there is insufficient scientific evidence that these analyses have had a significant social impact in terms of overcoming these exclusions and moving towards the inclusion of these groups. Horizon Europe and other scientific research programmes, such as the R&D&I Plan, have gone a step further by prioritising scientific analyses of actions and strategies that contribute to inclusion. This document shares this European priority, presenting actions and strategies whose evidence shows the real social impact and inclusion of the different target groups to achieve, in practice, an inclusive communication of science.

Scientific evidence

In their orientation towards 'Open Science', current scientific research programmes, policymakers and even citizens differentiate scientific evidence from the subset of scientific evidence of social impact. Everyone has the right to enjoy and play a leading role in the communication of all scientific evidence, regardless of its current usefulness or not, for the development of policies, strategies or actions that help to solve their problems. However, of all this scientific evidence, there is a subset that has already shown social improvements: the scientific evidence of social impact. This type is the one which addresses the societal challenges outlined in the United Nations 2030 Agenda for Sustainable Development[63] as well as other areas (or KIPs), such as citizen engagement. Although it is possible to motivate currently excluded sectors to disseminate and communicate all scientific advances, it is important to awaken and/or nurture this motivation and curiosity for science to emphasise the social impact on their lives, and to which some of this scientific evidence is already contributing.

Replicability and sustainability

Not only Horizon Europe but also the research programmes of the different Directorates-General of the European Commission aim to find policies, strategies and actions that have been successful in one context and are replicable in others,

63. https://www.un.org/sustainabledevelopment/es/development-agenda/

as well as sustainable. The words good (from good practices) or *best* (from best practices) have been replaced by the word *successful*[64]. In this sense, a **'successful action'** is one that has not only been successful in one context, but has also demonstrated its replicability in other contexts, as well as its sustainability over time. Many practices regarded as good have the limitation of not being replicable, thus serving as a source of admiration, but not as a basis for successful policies or actions elsewhere.

Bottom-up approach and impact

One of the key concepts in European scientific research programmes today is the co-creation of scientific knowledge between people professionally engaged in science and the rest of the public. On the other hand, citizen participation in science is also included as one of the main areas of the social impact required. The hierarchical relationship linked to the top-down is being replaced by a dialogical relationship that contributes to a better creation of scientific knowledge, to social impact and to greater public confidence in the 'authority' of science, in the 'authority' of the best evidence[65]. In this way, **the traditional figure of a hierarchical authority of science that did not submit to dialogue on the arguments and evidence presented by the people, groups and institutions involved, thus limiting both the scientific level and its social impact, is overcome.** Although all successful initiatives (including the top-down ones) with the greatest impact must be considered, the bottom-up ones, which are sometimes more difficult to detect, must also be included. Social networks are one of the communication spheres in which these initiatives are generated and there are already scientifically endorsed methodologies for detecting and promoting them[66]. Likewise, we should not overlook the fact that, in our country, the digital divide and the access of the most vulnerable groups to new

64. Aiello, E., Donovan, C., Duque, E., Fabrizio, S., Flecha, R., Holm, P., Molina, S., Oliver, E. & Reale, E. (2021). Effective strategies that enhance the social impact of social sciences and humanities research. Evidence & Policy, 17(1), 131–146.

65. Soler-Gallart, M. (2017). Achieving Social Impact. Sociology in the Public Sphere. Switzerland: Springer; Dryzek, J., Baehtiger, A., Chambers, S., Cohen, J., Druckman, J., Felicetti, A., . . . Warren, M. (2019). The crisis of democracy and the science of deliberation: Citizens can avoid polarization and make sound decisions. Science (American Association for the Advancement of Science), 363(6432), 1144.

66. Pulido, C., Redondo-Sama G., Sordé-Martí T., & Flecha, R. (2018). Social impact in social media: A new method to evaluate the social impact of research. PLoS ONE, 13(8): e0203117. doi: 10.1371/journal.pone.0203117

information and communication technologies, and with it, to virtual spaces for public debate and decision-making, remains a reality in which much can still be done[67]. For this reason, outside the virtual sphere, even in the most excluded neighbourhoods and villages, there are bottom-up, face-to-face initiatives that are largely absent on social media and must also be valued.

Methodology used for the selection of cases and success stories and actions included

To identify the successful cases and actions included in this document, the work of four experts in the areas considered in the analysis was carried out. Based on the criteria for identification and selection explained above, the final selection of practices has been made through a process of **open dialogic peer review** that is already being used in the international scientific community, both by platforms or initiatives for inclusive scientific communication of science, as well as by high-impact scientific journals that are increasingly moving towards this open component in peer review, and in connection to this, towards a dialogic methodology.

Each of the four team members initially selected the ten successful cases and actions in inclusive science communication (within their area) for which there is the most solid quantitative and qualitative evidence corresponding to each of the agreed criteria. Subsequently, in a dialogical way and in constant meetings, the whole work team was able to learn of the forty cases initially selected, thus being able to provide an interdisciplinary perspective that would help in the subsequent filtering of the twenty cases that were finally included. In addition to this, wherever possible, we have accessed detailed information on these cases by contacting their work teams or those in charge of them, which has allowed us to learn about the relevant aspects of the inclusive processes, both in their design and their implementation.

Thus, the **twenty successful cases and actions finally included** in this section are representative of successful actions contributing to an inclusive dissemination and communication of science in the above-mentioned areas, at a national level.

67. Pérez-Amaral, T., Valarezo, A., López, R., & Garín-Muñoz, T. (2021). Digital divides across consumers of internet services in Spain using panel data 2007–2019. Narrowing or not? Telecommunications Policy, 45(2), 102093.

The work completed by the team has been complemented with an analysis of the role that individuals and groups are already playing in the dissemination and inclusive communication of science in social networks in each of the four social areas addressed. With this diversity of complementary views, a broad view of this active role has been achieved in both face-to-face relations and social networks. For this specific task, **SISM methodology, Social Impact in Social Media**, an innovation that was one of the pillars to draft the two reports funded and published by the EC in its task of guiding all those doing research in Europe on how to include the social impact dimension in this research, Applying relevance-assessment methodologies to Horizon 2020[68] and Monitoring the Impact of EU Framework Programmes have all been implemented[69] . The SISM methodology focuses on the analysis of quantitative and qualitative content present on social media (e.g. Twitter, Facebook, YouTube, Reddit, among others) in relation to the dissemination, transfer and social impact of science[70].

During the pandemic, we have witnessed an acceleration of activism in the networks in favour of the dissemination and communication of scientific evidence. Contrary to what some media have claimed (without evidence), Social Media Analytics and, specifically, the SISM methodology, Social Impact in Social Media, has shown that there have been more Tweets about COVID-19 with hoaxes than with evidence[71], but that more **Tweets with evidence have been retweeted. On the other hand, scientific research has also shown that when activist profiles include scientific evidence in their arguments instead of relying on opinions, their impact is greater**[72]. Therefore, policies, programmes and actions are required for the dissemination and inclusive communication of science that provide scientific evidence to this activism on the networks.

68. European Commission (2017). Applying relevance-assessing methodologies to Horizon 2020.

69. European Commission (2018). Monitoring the Impact of the EU Framework Programmes. Publication Office of the European Union, Luxembourg. Available online: https://op.europa.eu/en/publication-detail/-/publication/cbb7ce39-d66d-11e8-9424-01aa75ed71a1

70. Pulido, C., Redondo-Sama G., Sordé-Martí T., & Flecha, R. (2018). Social impact in social media: A new method to evaluate the social impact of research. PLoS ONE, 13(8): e0203117. doi: 10.1371/journal.pone.0203117

71. Pulido, C. M., Villarejo-Carballido, B., Redondo-Sama, G., & Gómez, A. (2020). COVID-19 infodemic: More retweets for science-based information on coronavirus than for false information. International Sociology, 35(4). https://doi.org/10.1177/0268580920914755

72. De Botton, L.; Ramos, R.; Soler-Gallart, M.; Suriñach, J. (2021). Scientifically Informed Solidarity: Changing Anti-Immigrant Prejudice About Universal Access to Health. Sustainability, 13, 4174. https://doi.org/10.3390/su13084174

For the analysis carried out in this study, SISM has been used in the social network Twitter in the light of three objectives. Firstly, to determine the actors who are actively disseminating and communicating scientific knowledge in the four areas studied. Secondly, to identify the organisations of the groups and individuals who are among those performing this dissemination. And thirdly, to identify the individuals from the actual groups (those self-identified as such) who are among those carrying out this dissemination. For the three objectives, the communicative acts of the networks (Tweets, posts on Facebook or Reddit, Instagram stories, or the like) to be analysed have been selected through the identification of keywords in each area.

SISM analysis results

Among the annexes to this document is the study carried out for each area, which should only be taken as a first approximation that will be enriched and perhaps partially corrected in subsequent studies. Here is a summary of some aspects that should be highlighted[73].

Most of the Twitter profiles that disseminate scientific evidence belong to the groups and individuals themselves (self-identified as such) in three areas: disability (65%), LGBTI+ people (52%) and gender and socio-cultural situation (44%)[74]. For their part, the profiles of the administrations play a much more secondary role, not reaching 10% in any of these three areas. There are, therefore, initiatives in society itself which, if promoted by appropriate policies, can be much more successful than if we try to replace them (instead of complementing them) with others launched by the actual administrations.

However, this relationship is inverted in the area of cultural groups and groups at risk of social exclusion, and specifically for the Roma community sub-area, which has been analysed through the SISM[75]. In the Roma sub-area, the profiles

73. It should be noted that this analysis and the data used in it are available for anyone interested to participate in the open dialogic review process, or to reuse them in the light of new research objectives.

74. It should be noted here that a person from the group in each of the areas was considered to be a person who self-identifies as such and explicitly states this on their own Twitter profile.

75. The sub-field of Roma people has been chosen as representative of the broader field of cultural groups at risk of social exclusion, as this is considered, according to existing data, to be the group that is most discriminated against in Europe. See: European Union (2019) Special Eurobarometer 493. Report. Discrimination in the European Union. Available online: https://europa.eu/eurobarometer/surveys/detail/2251

of groups and individuals represent 17.8%, while those of administrations account for 53%. This should be understood in context, since in relation to the Roma community both percentages are already very high. Otherwise, a widespread hoax would lead to interpreting this difference as being determined by the much lower socio-economic level of the average Roma person compared to the average of people in the other three areas.

Data help to increase knowledge if they are interpreted by taking into account the scientific literature already available, especially if the aim, as is the case with current international scientific research, is not to stop at diagnoses that do not overcome inequalities, but to discover actions that succeed in overcoming them. An analysis of Twitter content shows that Roma organisations and individuals are very active in disseminating science. This overcomes the 'inclusion crusades' of certain structures that Emily Dawson rightly criticises in this publication. The SISM analysis also clarifies that the overcoming of the mentioned deterministic hoax is due to the centrality of the Roma community itself, which gains the support of institutions and research groups for its inclusive science communication. On the other hand, the SISM analysis suggests that the media are not very active in the dissemination and communication of science in these four specific areas: gender and socio-cultural situation; cultural groups and groups at risk of social exclusion; disability; and LGBTI+ people (see "SISM" Annex).

This contrasts with what is being done by the media in other areas, such as health, for example. In the absence of more detailed analyses, a plausible hypothesis in the light of available scientific literature is that the search for an audience in a time of crisis linked to the health situation and the pandemic leads to basing health claims on evidence, while the information provided on some of these four areas is based on the hoaxes that much of the audience likes to read, hear and see[76]. The policies to be developed to overcome this situation cannot be related to intervention in the media but, on the one hand, to reaching

76. Scheufele, & Krause, N. M. (2019). Science audiences, misinformation, and fake news. Proceedings of the National Academy of Sciences - PNAS, 116(16), 7662–7669. https://doi.org/10.1073/pnas.1805871115; Tsfati, Boomgaarden, H. G., Strömbäck, J., Vliegenthart, R., Damstra, A., & Lindgren, E. (2020). Causes and consequences of mainstream media dissemination of fake news: literature review and synthesis. Annals of the International Communication Association, 44(2), 157–173. https://doi.org/10.1080/23808985.2020.1759443; Montesi. (2021). Understanding fake news during the Covid-19 health crisis from the perspective of information behaviour: The case of Spain. Journal of Librarianship and Information Science, 53(3), 454–465. https://doi.org/10.1177/0961000620949653

an agreement between public authorities, the media and scientific societies and, on the other hand, to providing the public with the tools to quickly and easily distinguish between media claims that are hoaxes and those based on evidence.

The consequence derived from this exploratory study to inform future policy is clear: to develop actions to effectively transform the potential of these groups and individuals for science outreach and communication in the environments where it is most needed, including mentoring by professionals and expert teams.

Final remarks

The work completed by the team in the four areas addressed, as well as the exploratory analysis carried out through SISM, reveals that there are people, groups and organisations in our society that are already doing excellent dissemination work and inclusive communication of science at the grassroots level, both in their face-to-face (offline) relations and interactions and in the (online) networks. The content of this dissemination focuses especially on scientific evidence of social impact on the issues that most directly affect them, and which have already been targeted by the United Nations Sustainable Development Goals for 2030 (e.g. improving the quality of education; overcoming violence; access to the labour market; the climate crisis and how to reverse it, among others).

The twenty selected success stories presented in the following sections illustrate how their actions move in the same direction as the EU's current priorities, namely co-creation, social impact and, as part of this, citizen participation. At a very low cost, they enable major improvements in the environments they reach through their dissemination and communication of scientific knowledge regarding their situation. The results discussed here suggest that providing scientific evidence to activists and other social actors against network hoaxes is a way to contribute to curbing hoaxes and providing evidence-based information.

Finally, and in relation to the overall content of this chapter, it is important to mention two aspects of the methodological limitation and the continuity of what we share in this study. On the one hand, it is worth noting that one issue that has been pointed out as a limitation of the work process within the team has been the increasing difficulty of accessing knowledge and evidence that either has not been published in open access or for which there is no access

from the virtual environment. We must not lose sight of this issue to ensure that we also consider the contributions being made by individuals and groups in the offline sphere, outside the virtual environment. However, while the results obtained and explained in this paper are not necessarily replicable in non-digital environments, or in those excluded from the virtual world, they do serve as an approximation. On the other hand, it is the intention of this book to serve as a guide to show and explain those cases and successful actions that are being implemented in Spain or developed from here, in the hope that this effort will be the first project of its kind, but not the last. The periodic updating of this work by different people and institutions from the world of science will make it possible to show and make available to the public the work that is being carried out on the national scene by a diversity of actors whose mission it is to foster the availability of the most important scientific advances from which our society as a whole benefits.

Successful Cases and Actions in Inclusive Science Communication

Gender and Socio-cultural Situation

Milagros Sáinz Ibáñez

The under-representation of women in many scientific fields is a phenomenon in most Western countries[77]. This implies the **absence of female role model**s in the different fields of knowledge, which contributes to the fact that young women and girls, particularly, do not find inspiration in female figures who have contributed to scientific and professional advances in these fields[78]. In this way, stereotypes and beliefs about women's lack of ability to contribute to advances in science continue to be reproduced — in other words, it is still believed that if women are not visible in these fields, it is because they do not have sufficient capacity, although what really underlies this is a phenomenon of discrimination linked to the predominantly male conception around which science has

77. Unesco. (2017). Cracking the code: Girls' and women's education in science, technology, engineering and mathematics (STEM). https://en.unesco.org/unesco-international-symposium-and-policy-forum-cracking-code-girls-education-stem.

78. (Sáinz, M. 2020). Brechas y Sesgos de Género en la Elección de Estudios STEM. Por qué Ocurren y cómo Actuar Para Eliminarlas? Sevilla: Centro de Estudios Andaluces.

revolved throughout history[79]. But it also means that the gender perspective and dimension have not been included in scientific knowledge and that, to this day, science does not take into consideration the needs and particularities of the heterogeneity intrinsic to the universe of women[80].

There is much evidence to support the need to show female role models in different fields of science and the way this encourages young girls to feel that they belong in science[81], increases their interest and motivation to enrol in STEM[82] fields, eliminates negative stereotypes about girls' low competence in these fields and encourages girls to positively value science and technology fields as an attractive option for the future[83]. It is, therefore, vital that citizens in general, and the younger generations being educated through the education system in particular, are continuously exposed to examples of women who have excelled in different scientific fields through different sources (media, books and educational materials). In order to encourage female role models to inspire young girls' scientific vocations, it is important not only to present examples of outstanding women, but also to present examples of women with whom it is easy to identify because they have the same social and personal characteristics (e.g. sharing similar rural origins). Similarly, many scientific works support the need **to incorporate a gender perspective in research and the dissemination of scientific advances in the different fields of knowledge**[84].

All this has led to numerous bottom-up projects and initiatives that promote the inclusion of the feminist and gender perspective in the dissemination and communication of science and culture. Although there are numerous actions being

79. Olsson, M., and Martiny, S. E. (2018). Does exposure to counter stereotypical role models influence Girls' and Women's gender stereotypes and career choices? A review of social psychological research. Front. Psychol. 9:2264. doi: 10.3389/ fpsyg.2018.02264

80. Schiebinger, Londa, and Ineke Klinge. 2013. Gendered Innovations: How Gender Analysis Contributes to Research. Luxembourg: Publications Office of the European Union.

81. O'Brien, L. T., Hitti, A., Shaffer, E., Camp, A. R. V., Henry, D., and Gilbert, P. N. (2017). Improving girls' sense of fit in science: increasing the impact of role models. Soc. Psychol. Pers. Sci. 8, 301–309. doi: 10.1177/194855061667 1997

82. Shin, J. E. L., Levy, S. R., and London, B. (2016). Effects of role model exposure on STEM and non-STEM student engagement. Journal of Applied Social Psychology 46, 410–427. doi: 10.1111/jasp.12371

83. González-Pérez, S. Mateos de Cabo, R. & Sáinz, M. (2020). Girls in STEM: Is It a Female Role-Model Thing? Frontiers in Psychology., 11, 2204. doi:10.3389/fpsyg.2020.02204

84. Tannenbaum, C., Ellis, R.P., Eyssel, F. et al. Sex and gender analysis improves science and engineering. Nature 575, 137–146 (2019). https://doi.org/10.1038/s41586-019-1657-6.

carried out by citizens to disseminate scientific aspects with a feminist and gender perspective, in this space we have selected five of those that meet the selection criteria established by the work team. Some of the cases selected are aimed at favouring inclusion in other social aspects in addition to gender, such as those linked to the socio-cultural level and environment, disability or sexual orientation.

1. Herstóricas: history, women and gender

Herstóricas[85] is a cultural and educational project aiming to make visible and value the historical contribution of women in society. It also reflects on the absence of women in the dissemination of historical events from a feminist perspective. It was created with the idea of encouraging, disseminating and promoting values of gender equality in a real and effective way in all areas, promoting diversity with an inclusive approach.

The recurrent exclusion of the role played by women in the great and small events of history is reversed through the development of various informative activities aimed at people with an interest in the subject, such as workshops, courses, walks and guided tours of cities where the role of women in various aspects of history is highlighted (i.e. mapping of cities or street names). These activities try to involve the public to make them aware of the ins and outs behind the continued invisibility of women in history. For example, the activity 'Witches Night' uses a playful and relaxed role-playing technique through which participants interpret episodes from the lives of some women who were considered to be witches for being ahead of their time and not following the established norms that prevented them from participating in knowledge and scientific development.

It also encourages citizens to propose actions on how to incorporate a gender perspective in the management of historical heritage. *Herstóricas* publishes a monthly bulletin, which informs about the activities planned. Through training and dissemination actions such as workshops, visits and guided tours, the project is responsible for making visible the role that women have played throughout history, fighting against gender roles and stereotypes that have been assigned to women.

85. Manager/contact: Sara López (Chairperson and scientific manager) herstoricas@gmail.com. Link: https://herstoricas.com/

Among evidence of social impact there is scientific evidence that has been published in articles in specialised journals. *Herstóricas* is actively involved in the production of a section of monographic podcasts on history in the *Carne Cruda*[86] (Raw Meat) programme and has been the subject of study in different research projects[87]. Those responsible for this project are the authors of educational materials aimed at all sectors of the population, with special emphasis on people with fewer educational and cultural resources.

They carry out activities that can be easily replicated in the framework of projects with local or state funding, such as guided tours and training courses for different types of adult and child audiences. In addition, they are self-financed through the payment of some of the activities they promote or through an online shop with the association's merchandising products, such as badges, bags, notebooks and tour guides for Granada and Madrid, among others. An example of this type of material[88] includes notebooks with illustrations on the cover with the image of relevant female figures in Spanish history, such as Emilia Pardo Bazán, Victoria Durán and Federica Montseny.

In addition to the monthly newsletter, this project also has a blog through which information is provided on the different dissemination and research activities organised, with the aim of involving different sectors of citizens of different ages in the generation of knowledge related to the project's themes. For example, in the 'Local Herstoric' section, work is carried out using two approaches: one is historical, based on specific documentary and bibliographic research; the other is a community approach, in which the historical research work is completed with the testimonies of the residents of each locality who have travelled through, lived in and/or inhabited it[89]. This project has been selected as an example of

86. Historical content with a feminist perspective (i.e. plague, influenza and other plagues of history, the colonisation of America; Al-Andalus, etc.). For more information visit https://herstoricas.com/carne-cruda/

87. The following publication is worth noting: Herstóricas (2019). ¿Dónde están las mujeres en la memoria democrática?. Revista PH96. DOI: https://doi.org/10.33349/2019.96.4319.

88. For more information on the materials, please visit the following link: https://herstoricas.com/categoria-producto/libretas/

89. On Instagram they have 790 posts, 9,902 followers, 1,026 following; on Twitter they have 1,644 Tweets; 5,665 followers, 1,147 following; on Facebook 5,752 likes; 6,120 followers. They also have podcasts on Spotify (eighteen playlists and 52 followers) and a Telegram account (46 subscriptions) and LinkedIn (275 followers).

good practice in heritage activation by the Andalusian Institute of Historical Heritage, within the Actívate Network. It has also been selected by the Ministry of Culture and Sport to be presented at the 4th Culture and Citizenship Meeting in the session "Stories from feminism and diversity", and has been selected by Medialab UGR for the 1st LabIN Granada meeting on tourism and the city.

2. Women with science

In this project[90], overcoming the traditional exclusion of women from science is developed by showing women's contributions to science through different sections, in which women's lack of visibility is denounced. The section 'Science and More' deals with stories related to science and women who, without having a scientific background, have contributed to its advancement. In the section 'Ephemerides', the birth dates of women scientists from any era are remembered, with a short text showing their main contributions. The 'Short' section includes quotes and reflections by women scientists on different topics in science and the biases in their professional practice. The section 'On the web' consists of audio pieces and videos of interviews with women related to the world of science, radio programmes on women and science and recordings of informative conferences given by women scientists explaining their contributions in different fields. The section 'Between pages' comprises a selection of biographies of women scientists or popular science texts written by women. The section 'Milestones' is dedicated to presenting exhibitions, initiatives commemorating a historical event, projects carried out to make women scientists visible in different formats and didactic materials. The 'By Peers' section deals with conversations between peers where one of the people — a scientist — is the protagonist, and the other person — a colleague or someone working in the same field — holds a conversation with her, highlighting her contributions. The 'Protagonist' section contains interviews or portraits of women scientists by professionals from the world of journalism. In the 'Alphabetical Portrait' section, the life and contributions of a scientist are presented in alphabetical order. Finally, the 'Scientific Lives' section deals with biographies of pioneering women scientists, focusing on their lives and difficulties, as well as the scientific contributions they made.

90. Manager/contact: Cátedra de Cultura Científica, Universidad País Vasco. Marta Macho Stadler (marta.macho@ehu.eus). Link: https://mujeresconciencia.com/

The evidence of social impact is mainly based on how, by making women's scientific contributions visible, it is possible to break down public stereotypes about women's participation in science. It is also based on how girls and young women do not find female role models to inspire their vocations and on the need to value the talent of women who have contributed to advances in science, overcoming many of these stereotypes and traditional conceptions about the role that women should play in the different societies in which they have lived.

The project has different elements (the deployment of digital resources used in the different sections) that can be replicated in many other areas. For example, sport, politics, education and audio-visual media. In terms of sustainability, some sections such as 'Scientific Lives' have received the support of a European Project[91] by the Basque Centre for Applied Mathematics (BCAM) and the University of the Basque Country. On a general level, it receives funding from the Euskampus Foundation. In terms of its social impact, it is a project that has a significant impact on social media[92]. Some of the sections are particularly rich, with authors from a variety of backgrounds and interests. It is also mentioned in some digital media as one of the bottom-up initiatives to make the role of women in science more visible[93].

3. Didáctica 2.0: Museums for women or how to apply equality in culture and heritage

Didáctica 2.0[94] is a project aimed at raising awareness of the presence and contributions of women in art. It is of an informative nature and makes it possible to involve different members of the public who are interested in visiting five major national museums: the González Martí Ceramics Museum, the Archaeological Museum, the Prado Museum, the Reina Sofía National Art Museum and the Costume Museum, with which the project works. In addition, many of the

91. Math Rocks #(Ref. 777778). For more information: https://sites.google.com/prod/view/mathrocks/home?authuser=0), from the Horizon 2020 programme.

92. On Twitter they have 62,800 followers, 86,000 following, and 63,600 Tweets. On Facebook, 50,668 likes and 52,734 followers. They are also on Instagram.

93. An example of the media allusion to bottom-up initiatives like this can be found in the following article published by The Conversation: https://theconversation.com/cientificas-y-brecha-de-genero-el-cambio-debe-empezar-en-la-propia-universidad-149478.

94. Manager/contact: Marian López Fernández Cao (asevrrii@ucm.es). Complutense University of Madrid. Link: https://museosenfemenino.es/

activities incorporate numerous aspects of gender intersectionality with other axes of possible inequality, including that related to the different digital divides. *Didactica 2.0* is the result of an R+D+I project, which is applied to the five museums mentioned above.

Its lines of action could inspire other museums and art centres, its sustainability and continuity over time having been achieved through various European projects such as *Divercity*[95], which aims to promote cultural access to museums for people at risk of social exclusion. The project collaborates with various public and private institutions in the design of materials and plans that conceive artistic creation as a means for the introduction of values in education, as well as in the introduction of groups with special needs in museums.

There is a great deal of evidence to which they have contributed with their work, inspired by the scarce visibility of women as art producers in museums, but also by the continuous appearance of women in art and heritage as secondary figures with little power[96].

The project shows different signs of sustainability and involves the democratisation of museums and the use of a methodology that can be replicated in all cultural centres and institutions. To achieve this, they develop educational activities on the website with a feminist perspective and bring many works of art and the rooms where they are located closer to the public. For example, in the Museo del Traje (the Costume Museum) you can find the tour *Bodies that Can Be Modelled. Clothing as an Instrument of Control of the Female Body*. At the Archaeological Museum, the tours *Women in Imperial Roman Society and The Construction of Gender in Classical Greece*. Likewise, at the Reina Sofía Museum, there is the tour *Feminism. A Feminist View of the Avant-Garde*. At the Prado Museum, one can find the tours *Women and Power and Work and Women*, and at the González Martí Museum the tour *Women in the Museum*. It is also worth highlighting the creation of 'Didactic 2.0 Guides' to work on the different tours offered in these museums.

95. DIVERCITY "Diving Diversity in Museums and in the City" is a project that seeks to introduce diversity in museums and the city. It is funded by the European Union and led by the Complutense University of Madrid. https://www.ucm.es/divercity.

96. Lopez-Fernandez, M. (2017). Education, feminism and art: or how to educate in art including the experience of women. In Henar Gallego Franco (coord.), Mónica Moreno Seco (coord.), María Amparo Pedregal Rodríguez (hom.) Cómo enseñamos la historia (de las mujeres) homenaje a Amparo Pedregal. Alicante: Editorial Icaria.

Apart from the impact of their latest publications (guides for teachers through which they work on equity in artistic creation, individual and collective books, book chapters, or the research journal Arteterapia y educación artística para la inclusión social), they have a discreet appearance on social media. One should also mention the Ariadne project, improving the well-being of migrants through art[97], in which they have participated as coordinators. Training and consultancy has been provided to various national and international institutions.

4. Genport: Your gateway to gender and science resources

This project[98] consists of an internet portal aimed at the co-creation of content on different aspects related to research with a gender perspective. On this platform, people working on issues related to gender, science, technology and innovation create and share digital resources (scientific articles, reports on policies, research projects, information on conferences and other events, institutions and people working on these issues, a blog on gender and science, and a section on policies and the legal framework) through a content generation platform. Interaction between users is promoted through participation in different thematic groups.

Genport is an example of a digital repository open to the use and contributions of anyone interested in issues related to science and innovation with a gender perspective. In this sense, the platform compiles various digital resources (articles, books, book chapters, conference proceedings, doctoral theses, or reports on policies or practical measures) which provide much scientific evidence to reduce the gender gap in the scientific field and the incorporation of gender equality in the contents of research in any scientific field, as well as in the evaluation of careers and scientific excellence[99].

This portal is used by many international institutions as a framework through which to share digital resources on the use of a gender perspective in research

97. Ariadne Project: http://www.ariadne4art.eu/

98. Manager/contact: Jörg Müller, Grupo de Investigación sobre Género y TIC del IN3 de la UOC. jmuller@uoc.edu; https://gender-ict.net/projects/genport/
Link: http://www.genderportal.eu/

99. One of the scientific results associated with this project is the article: http://europeanscienceediting.org.uk/articles/genport-your-gateway-to-gender-and-science-resources/

and on how to integrate the gender/sex dimension into research content in any field of knowledge. Numerous policy briefs used by the European Commission on gender and science are published through the portal.

In terms of replicability, it is replicable for other thematic lines with resources. It is a project funded under the 7th Framework Programme of the European Union which, despite having ended its funding in 2016, continues to be linked to other European projects, such as *ACT* or *Efforti*.

The activities promoted through the portal respond to the need to disseminate research with a gender perspective among experts and non-experts in gender and science, both researchers and policymakers or professionals. This internet portal[100] rgathers a total of 871 registered users, belonging to a total of 285 organisations, with more than 1,571 shared resources, 116 projects, 307 events, 126 blog posts, and twenty group users (data available at the beginning of December 2021).

5. Women in the Spotlight

The *Mujeres Protagonistas* project[101] aims to make women's contributions to the different fields of knowledge visible through three main lines of action: 1) A collection of twenty informative books on the role of women in different fields of knowledge (sport, health, religion, the discoveries of mankind, cinema, science and technology and the media). 2) A database with the biographies of hundreds of women who have made contributions to different fields of knowledge throughout different periods of our history. 3) The web space for digital encounters, the voice of women, which provides information on entities and projects that work to raise the voice of women in the different fields of knowledge.

Mujeres Protagonistas is a project aimed at providing teachers with digital and traditional resources to work on content related to the absence of women in the teaching of a wide range of subjects. Evidence has been found of how secondary

100. It is the most consulted portal in the ranking of European projects with a gender perspective (@GenderPORTal: 2,018 followers).

101. Manager/contact: Editorial Santillana. https://santillana.es/mujeres-protagonistas/

school teachers in some schools have been inspired by the project to carry out activities aimed at making women's contributions to different fields of knowledge more visible among the education community[102]. In parallel to this project, educational projects are also being developed in which resources are provided to ensure that the presence of men and women in the teaching of different subjects is as balanced as possible. Through numerous activities (text commentaries or readings), the aim is to encourage students to reflect on the absence of women in positions of power in the different stages of history.

The exclusion of women from progress in the different fields of knowledge is addressed by means of a series of teaching resources aimed at teachers. There is a great deal of scientific evidence that supports the implementation of a project with these characteristics, as it provides teachers at different educational levels with the necessary resources to work on equality issues and thus compensate for the low presence of women in teaching materials. There is evidence of the scarce presence of women in teaching at different educational levels, such as the work carried out by López-Navajas in the context of secondary education[103].

Many of the activities are easily replicable by teachers and can be transferred to different subjects and fields of knowledge. This is a project that is connected to a portal of didactic resources for teaching[104] aimed at infant, primary and secondary school teachers who work with materials from the Santillana publishing house. This community has 133,341 users, with access to 8,549 resources. From an international perspective, there is even a network in Argentina with the same name.

For its launch at the beginning of 2019 in commemoration of International Working Women's Day, the project was disseminated through various traditional media (TVE, Radio 5, RNE, Cadena Ser, Cadena COPE o *La Vanguardia*). Subsequently, reports and articles have also appeared in media such as the

102. See: https://www3.gobiernodecanarias.org/medusa/edublog/iesofra/2020/03/12/mujeres-protagonistas-un-proyecto-para-la-igualdad/; https://iespedrodevaldivia.net/2019/03/08/el-ies-pedro-de-valdivia-con-las-mujeres/

103. López-Navajas, A (2014). Análisis de la ausencia de las mujeres en los manuales de la ESO: una genealogía de conocimiento ocultada. Revista de Educación, 363, 282-308. DOI: 10.4438/1988-592X-RE-2012-363-188.

104. See: https://www.e-vocacion.es

travel and culture magazine *Etheria Magazine*[105] or in El Economista on 11 February 2021, in conjunction with the International *Day of Women and Girls in Science*[106].

105. https://etheriamagazine.com/2019/03/19/mujeres-protagonistas-editorial-santillana/

106. https://www.eleconomista.es/ecoaula/noticias/11044166/02/21/La-editorial-Santillana-comprometida-con-la-igualdad-de-genero-a-traves-de-Mujeres-Protagonistas.html. La hora de la cultura - 24H RTVE https://www.rtve.es/alacarta/videos/la-hora-cultural/hora-cultural-04-03-19/5033958/

Area of Cultural Groups and Groups at Risk of Social Exclusion

Teresa Sordé Martí

Despite the increasing emergence of initiatives in which very diverse people have the opportunity to learn, but also to contribute to the development, dissemination and communication of scientific knowledge, actions that specifically target groups of people from cultural groups and those at risk of social exclusion can be further promoted. In this sense, some successful actions have been identified that demonstrate the potential and importance of this type of initiative, as active participation not only in benefiting from science but also in contributing to its advancement, dissemination and communication, which is key in the processes of full social inclusion of these groups.

International research points to the benefits of involving the highest possible diversity of cultural groups in the development of knowledge, from the Roma population (the largest non-migrant ethnic minority in Europe) to the Arab-Muslim population and immigrant population groups, among others; and to how increasing the participation of these groups not only contributes to the **democratisation of scientific knowledge**, but also helps to generate better results, thus contributing to an increase in social cohesion[107]. The selection presented here goes one step further and shows how these benefits for science and society are multiplied when the public is actively involved in the dissemination of science.

107. ERASMUS+ Project "ScienceLit: ScienceLit project: Scientific literacy for all! (2016–2018). Reference No.: 2016-1-ES01-KA204-025655http://www.sciencelit.eu/vzorcna-stran/

1. Instituto Escuela Mediterrani – Instituto Catalán de Paleoecología Humana y Evolución Social IPHES (URV)

The *Instituto Catalán de Paleoecología Humana y Evolución Social* (*IPHES* - Catalan Institute of Human Palaeoecology and Social Evolution) is a transdisciplinary institution promoting advanced research, education and knowledge transfer and social engagement with science. Therefore, it crosses and combines different fields of science (humanities and social sciences, but also geosciences and biosciences) to apply them to the study of human and social evolution. Its aim is to promote knowledge both about ancient human species and about human beings today. The IPHES leads the excavations at the Atapuerca site (Burgos). The action highlighted here is its collaboration with the Instituto Escuela Mediterrani, which has been developing over the last five years[108].

The Instituto Escuela Mediterrani[109] is an educational centre located in a neighbourhood of Camp Clar, on the outskirts of Tarragona, with a high level of vulnerability and a high risk of social exclusion. The school takes in pupils mainly from the Roma and immigrant communities. Until the 2010–2011 academic year, the school was in a very difficult situation, with a high level of school failure, high levels of absenteeism, problems of coexistence and a high level of conflict both within the school and in the neighbourhood. This extreme situation led to a debate among all members of the community to decide, through a democratic process, whether or not to transform the centre into 'Learning Communities' [110]. Since this transformation, there has been an unprecedented improvement in the school in every sense, both in terms of learning and in terms of coexistence and social cohesion.

Thanks to the important role played by the community in the centre's decision-making bodies, the actions carried out are co-created in dialogue with families and professionals. Among the activities, dissemination and scientific communication activities have been implemented by research groups of great

108. IPHES a les escoles | Evoluciona

109. https://agora.xtec.cat/iemediterranicampclar/pagines-dinici/

110. https://www.comunidaddeaprendizaje.com.es/

international prestige, one of these being the IPHES. Far from the preconceived ideas that exist in society about the lack of interest in science on the part of ethnic minorities and people at risk of social exclusion, the families of the *Institut Escola Mediterrani* encouraged opportunities for pupils of the school to participate in scientific activities taught by the IPHES during school hours. One of them was a visit to the IPHES centre by the pupils together with the teaching staff and families, specifically to one of the centres where top-level research is carried out in the field of human palaeoecology and social evolution. This visit helped families to learn about the work being carried out at the centre and, as a result, they requested that the family training programme should also include activities to raise awareness of the research carried out at the IPHES.

These first actions contributed to increasing the scientific activities carried out at the Mediterrani, both during school hours, where the T*ertulias Científicas Dialógicas* [111] were initiated and annual actions with the IPHES were stipulated, and in the extension of learning time, specifically during the summer activities organised at the centre, where repeated annual visits to the IPHES and IPHES-organised summer activities at the centre have been promoted.

To consolidate these actions and respond to the dreams of the entire education community to continue increasing scientific activities, projects are being presented in the interests of formalising the participation of the IPHES in the *Institut Escola Mediterrani*. Some of these projects are funded by Fundación Española para la Ciencia y la Tecnología (FECYT).

During the sessions, a researcher from the IPHES deals with a wide range of topics: human evolution, cultural and biological milestones, hominids, and the Neolithic, among others. All these topics have been well received by all participants thanks to the effort to adapt the content to the diversity of ages of the attendees while maintaining a high level of content. The frequency of the workshops was also considered to provide more information on each topic

111. Salvadó, Z.; Garcia-Yeste, C.; Gairal, R., & Novo, M. (2021). Scientific workshop programme to improve science identity, science capital and educational aspirations of children at risk of social exclusion. Children and Youth Services Review, 129, 106189. https://doi.org/10.1016/j.childyouth.2021.106189; Gairal, R., Garcia, C., Novo, M.T., & Salvadó, Z. (2019). Out of school learning scientific workshops: Stimulating institutionalized Adolescents' educational aspirations. Children and Youth Services Review, 103, 116–126. doi: 10.3389/feduc.2019.00009

— for example, the workshops aimed at families were more generic explanations without going into detail on the content of the different topics, since, in this case, two annual sessions were held within the framework of family training, specifically with those families who were preparing to obtain the secondary school diploma. On the other hand, with infant, primary and secondary school pupils, the sessions were included within the subjects of social and natural sciences, thus making it possible to deal with the different topics in more depth by holding more sessions. An important issue to highlight was that at all times value was placed on lowering the expectations of the sessions or making the sessions more playful with little academic content due to the fact that they were vulnerable groups. On the contrary, the most up-to-date information on international research on the different topics worked upon has always been provided without reducing content.

The impact of projects and actions carried out has been recognised at an international level; the results have been published in scientific journals highlighting the quality of the actions implemented and the relevance of these actions in vulnerable groups. The experience has been successfully replicated in residential centres for educational action (centres where children and adolescents under the care of the public administration reside), carrying out four projects financed by FECYT and obtaining results with a high impact. Beyond the funding, this project has proven to be sustainable over time and also replicable in other spaces such as the Residential Centres for Educational Action, which take in minors under guardianship.

2. Roma Women's Association Drom Kotar Mestipen

The Roma Women's Association Drom Kotar Mestipen ('Road to Freedom') was created in 1999 with a common goal: to fight for the equality and non-discrimination of Roma women, promoting their participation in educational, social and cultural spaces[112]. Romani and non-Romani women of different ages, academic levels, professional profiles and socio-economic status continue to work to achieve this objective. The main activities of the organisation are the gatherings of Romani women, already in their twentieth edition, the job placement

112. https://dromkotar.org/es/inicio/

courses for Romani women as leisure time monitors and the Roma cafés, among many others. In 2009, the association received the Gold Award for Creativity and Innovation from the European Commission's Grundtvig Programme with the European project *EDUCAROM*.

Specifically, since its inception, its annual activities have included talks on scientific research and relevant topics such as the importance of education, the prevention of gender violence, cyber-bullying and human trafficking, among many others. These topics have been selected on the basis of the needs of the Roma women who participate in the association. In all of them, the researchers present the results and discuss them on an equal footing with the participants, thus enriching their conclusions. At the same time, the women who have attended these sessions become great disseminators, within their community, of the research results, encouraging the participation of others. For example, one of the association's key activities, the *Trobades d'Estudiants Gitanes*, can bring together more than 300 Roma women; these always include the presentation of research results and working groups to contribute and discuss them. This format was replicated in the organisation of the only two grassroots Roma women's congresses that have brought together women from more than fourteen European countries and in which research on labour market insertion, education, health and feminism, among other topics, has been worked on in egalitarian dialogue. The social impact of this organisation's activities has been analysed in different research studies and published in scientific articles[113].

As a result of the COVID-19 pandemic, the proposal arose to provide online training to facilitate access, as well as training on the pandemic itself, to provide important information to the entire community[114]. Replicating the Drom Kotar

113. Aiello, E., Amador-López, J., Munté-Pascual, A., & Sordé-Martí, T. (2019). Grassroots Roma Women Organizing for Social Change: A Study of the Impact of 'Roma Women Student Gatherings'. Sustainability, 11(15), 4054. doi: 10.3390/su11154054; Munte, a., Serradell, O., & Sorde, T. (2011). From Research to Policy: Roma Participation Through Communicative Organization. Qualitative Inquiry, 17(3), 256–266. doi: 10.1177/1077800410397804; Sorde, T., Serradell, O., Puigvert, L., & Munte, A. (2013). Solidarity networks that challenge racialized discourses: The case of Romani immigrant women in Spain. European Journal of Women's Studies, 21, 87–102. doi: 10.1177/1350506813510425; Contreras, A., Munté, A., Prieto, O., & Sordé, T. (2012). Immigrant and Native Romani Women in Spain: Building alliances and developing shared strategies. Journal of Ethnic and Migration Studies, 8(38), 1233–1249. doi: 10.1080/1369183X.2012.689179

114. (124) COVID19 Preguntes i respostes amb professionals i estudiants gitanes de l'àmbit de la salut - YouTube

Mestipen model, the Government of Catalonia's Integrated Plan for the Romani Population produced a series of informative videos with Romani professionals deeply rooted in the community on COVID-19, with the YouTube channel of the Integrated Plan for the Romani Population receiving more than 2,362 views and other similar initiatives organised by grassroots Romani associations[115].

3. Sappho and Adhyayana

The platforms of scientific evidence in gender and education, *Sappho and Adhyayana*[116] were created in collaboration with the H2020 ALLINTERACT project (SwafS-20-2018-2019: Building the SwafS knowledge base) of the European Commission. These platforms constitute a space of interaction for all citizens, a place to share doubts and scientific evidence to overcome hoaxes in various areas of gender and education that are highly widespread among the general population.

The contribution to overcoming exclusion arises from the debate that is being generated to refute claims such as Ausubel's[117] that African-American parents have little interest in their children's education because they themselves have not had access to education. When such a claim is published, many participants provide scientific evidence in the form of comments that help to disprove it[118]. This scientific evidence is necessary to establish whether it is evidence or a hoax, but evidence in the form of experience or personal accounts is also taken into account to support the claim. Each entry in the form of a post contains direct links to the scientific evidence, which can be accessed by all citizens. The classification as a hoax or evidence is the result of an open dialogic peer review process by the board, which reviews and assesses whether the articles and evidence accompanying the posts and comments have the required scientific level to support a claim and classify it within a category.

115. (124) COVID19. Pla Integral del Poble Gitano - YouTube
116. https://socialimpactscience.org/education/; https://socialimpactscience.org/gender/
117. Ausubel, D. P. (1968). Educational psychology. A cognitive view. New York: Holt, Rinehart and Winston, Inc, 440.
118. See this debate here: https://socialimpactscience.org/education/2021/01/13/many-negro-parents-have-had-little-schooling-themselves-and-hence-are-unable-to-appreciate-its-value/

The replicability and sustainability of the action can be seen in its durability over time since its inception in October 2020 and the increase in visits and participation by new users, which has grown to 64,737 visits in Sappho and 92,343 in Adhyayana and which have already been visited by 95 and 40 countries, respectively, at the time of writing. In addition, it builds on previous, well-established initiatives such as the SIOR open repository for social impact.

Sappho and *Adhyayana* have also been presented at different international congresses such as the European Sociological Association, the International Multidisciplinary Congress on Educational Research (CIMIE) and the International Congress on Science, Feminism and Masculinities (CICFEM), and their scope and impact is being studied for future scientific publications. Its regular use in university and higher education environments is also worth noting. In this sense, scientific evidence platforms have a bottom-up approach and are the result of a process of co-creation of science through participation and interaction between citizens with different academic and non-academic profiles. This impact can already be seen in the platforms' social networks, which, as they reach more spaces, achieve greater participation that improves not only citizens' access to science but science itself as a result of the diversity of interactions.

4. Memory Center Platform. Museo del Exilio (La Jonquera)

The Memory Center Platform is a platform in the process of creation of the H2020 SO-CLOSE project, whose host institution is the Museo del Exilio (Exile Museum, La Jonquera, Girona)[119]. The project aims to promote social cohesion and end the exclusion of refugees through digital and artistic tools. By sharing the cultural heritage of refugees and their life stories, the platform will serve to promote mutual understanding between refugees and the local community. It is based on the premise that when the common past is known, social cohesion between the different groups involved is fostered.

119. European Commission (2020–2022) SO-CLOSE Enhancing Social Cohesion through Sharing the Cultural Heritage of Forced Migrations. Website: https://so-close.eu/

The Memory Center Platform is still under development. However, the communicative methodology used in the project to collect the voices of refugees, through which researchers establish an egalitarian dialogue with them, has already proven to be a tool that generates social impact[120]. In this way, it ensures that the platform will respond to the needs of those historically silenced in much research. It is the refugees themselves who are deciding what the platform will be like; they are the protagonists of the research. Furthermore, collecting their life stories and cultural heritage means bringing to light the voices of groups whose history and heritage have been excluded from official heritage representation.

The platform is a response to overcoming exclusion by focusing on refugees or victims of forced migration, often victims of prejudice and marginalisation in the communities to which they migrate. Through cultural heritage, by bringing the common past together, social cohesion is fostered between refugees and those in the local community. As for the social impact, this is still in progress, but plans have been made to collect this evidence in the evaluation of the pilots of the tools created. Moreover, all tools are created using a bottom-up approach, i.e. it is the refugees themselves who have identified their needs and what tools are needed to meet them.

Its replicability in other areas has been considered from the design of the project. With the participation of four cultural institutions: The Peace School Foundation of Monte Sole (Italy), Villa Decius Association (Poland), The Exile Memorial Museum Consortium (Spain) and Contemporary Social History Archives (ASKI) (Greece), the methodology used for the creation of the platform has been created to be extrapolated to any place with a history of violence in the past, inside and outside Europe. Interviews with refugees have shown that they wish to share their cultural heritage and life stories with local communities. These results demonstrate the social impact by showing that, contrary to what is often claimed — for example, that migrants or refugees do not want to integrate — they want to

120. Racionero-Plaza, S., Vidu, A., Diez-Palomar, J., & Gutierrez Fernandez, N. (2021). Overcoming Limitations for Research During the COVID-19 Pandemic via the Communicative Methodology: The Case of Homelessness During the Spanish Home Confinement. International Journal of Qualitative Methods, 20, https://doi.org/10.1177/16094069211050164; Flecha, R. (2014). Using Mixed Methods From a Communicative Orientation: Researching With Grassroots Roma. Journal of Mixed Methods Research, 8(3), 245–254. doi: 10.1177/1558689814527945; Puigvert, L., Christou, M. and Holford, J. (2012). Critical Communicative Methodology: include vulnerable voices in research through dialogue. Cambridge Journal of Education, 42(2). https://doi.org/10.1080/0305764X.2012.733341

show their knowledge and culture and share experiences with local communities. In the same vein, it has also been noted that migrants and refugees are already using social media to express themselves and raise awareness about their situation, breaking down the preconceived idea that they are reduced to fragile and vulnerable people who have no capacity to act. Through egalitarian dialogue with refugees, it has been possible to obtain evidence that dismantles prejudices towards them, which in turn can generate greater social cohesion and impact.

The project also foresees the transfer of the knowledge created through activities targeting diverse sectors of society, such as academia, civil society and politics. Different languages and digital resources will be used to reach as many types of people as possible.

The co-creation model on which the Memory Center Platform is based is replicable in different places, both in museums and beyond, and places where there is a long history of war or persecution can implement this co-creation model based on cultural heritage. The Memory Center Platform is being created with sustainability as one of its pillars, and beyond the SO-CLOSE project through the host institution Museu de l'Exili (Exile Museum) from La Jonquera.

5. *Successful Educational Actions (SEAs)*

The Successful Educational Actions were identified as a result of the research of the FP6 INCLUD-ED project[121] yand are actions based on scientific evidence that have proven to have a social impact, generating educational success and improvements in coexistence in a wide range of contexts. These actions are: interactive groups, family education, educational participation of the community, dialogic model of conflict prevention and resolution, the 'Valientes Violencia 0' (*Zero Violence Brave*) club, dialogic gatherings, tutored library and dialogic teacher training[122]. All have been selected by the European Toolkit for Schools, part of the Education Gateway.

121. See: https://comunidades-aprendizagem.dge.mec.pt
https://www.comunidaddeaprendizaje.com.es/actuaciones-educativas-de-exito
https://www.schooleducationgateway.eu/en/pub/resources/toolkitsforschools.htm
http://crea.ub.edu/index/scientific-excellence/publications/wosarticles/?lang=es

122. They are briefly defined in: https://comunidadesdeaprendizaje.net/actuaciones-de-exito/

There are numerous articles of scientific impact and recommendations in the field of public policy that endorse the social impact of SEAs in around fifteen countries. Their impact was demonstrated from the outset as they were developed in co-creation with the people involved (families, children, young people, social entities, governments, etc.) and recreated at different educational stages, from childhood to adulthood, both in schools with a high socio-economic level and in those with serious difficulties. In 2011, the participants themselves shared its benefits in the European Parliament, to the consensus of the diversity of parties present there. This had a first political impact on various European recommendations for all member states, and the voices of the people themselves have driven the further transfer of these actions to the diversity of contexts. For example, when the literary dialogues were already achieving improvements in learning outcomes, education of feelings and access to culture, many people began to demand this same transformation in other areas such as art, music, mathematics and science. Thus, the *tertulias dialógicas* (Dialogue Gatherings) were recreated and extended to other areas of knowledge. For more than 40 years now, the tertulias have been improving on such profound issues as the eradication of violence, racism and social exclusion. Today, all SEAs continue to expand in an international network of 9,000 schools worldwide.

In contexts of social exclusion, SEAs broke the chains of inequality and cultural, academic and social impoverishment in which many of these schools found themselves. Based on scientific evidence, they rejected the false myth that educational outcomes depend on socio-economic status by ensuring that children from very low socio-economic and academic backgrounds achieved above-average results with the same resources as other schools. This has also been happening subsequently in around 50 schools at risk of exclusion in Portugal and in other contexts such as England and Mexico. It is the SEA participants themselves who become agents of dissemination, communication, socialisation and the transfer of scientific knowledge to new schools that want to improve. As a result, more and more people and communities include scientific evidence in their daily work, thus contributing to the democratic revolution of knowledge.

A specific example of this is the growing number of educational associations and social groups based on SEAs that have emerged in Spain to make it easier for any person and school to have access to these performances. Some of these are: the *Colectivo Pedagógico Adarra, Associació de Professorat Odissea, Iris AEBE, AEBE Cantabria and Asturias AEBE*.

The SEAs are international benchmarks in the incorporation of the best scientific knowledge in education, in egalitarian dialogue with the diversity of human and cultural capacities that people have. This has made it possible for these actions to be carried out in any context. The SEAs have proven to be replicable and sustainable over time and among the criteria with the greatest impact has been the participation of families and other community agents in all actions. Some examples are the scientific gatherings, which have allowed children and families to learn about scientific advances in cancer prevention or COVID-19; or the dialogic model of coexistence, which has provided them with scientific evidence on the prevention of gender violence, even addressing the prevention of sexual abuse of children in the most difficult moments of the crisis through COVID-19. Another impact is the Dialogical Teacher Training Seminars 'On the Shoulders of Giants', of which there is clear evidence of the transformation of teachers: from having almost no access to scientific evidence in education, to using it on a daily basis to create new realities that bring success and empower citizens[123]. City councils, childcare centres, psychological offices, non-governmental development organisations, savings banks, family associations, mental health centres, etc. are extending SEAs thanks to the stories of transformation that emerge every day. Their spectrum of action extends to other environments that also want to achieve these improvements, as is the case of literary gatherings to promote mental health and child welfare; interactive groups in mechanics training cycles; dialogic gatherings in penitentiary centres, homes for minors and religious orders to achieve the creation of meaning; or the Zero Violence Brave club in sports spaces and school catering companies. In this way, SEAs offer citizens a wonderful opportunity to transfer scientific knowledge and transform social realities according to their needs, hopes and dreams.

123. Rodriguez, Luis Condom-Bosch, J., Ruiz, L., & Oliver, E. (2020). On the Shoulders of Giants: Benefits of Participating in a Dialogic Professional Development Program for In-Service Teachers. Frontiers in Psychology, 11, 5–5. https://doi.org/10.3389/fpsyg.2020.00005

Area of Disability

Diego Ortega-Alonso

The selection of disability-related practices aims to show the huge variety of fields or areas of science in which these practices are developed, where they proactively involve different groups of people with disabilities and their **associative movements** in the development and execution of the actions. We find everything from general dissemination practices that use communication processes to show the capabilities of the participants, to projects led by scientists who have some disability, to inclusive museum initiatives or proposals that seek to involve people with disabilities and/or other disadvantaged groups in research and transfer activities.

Before continuing, it is worth looking at the criteria for using the word disability to refer to a diverse group whose definition has long been the subject of controversy, especially through the use of concepts such as functional diversity[124]. The criteria of the Spanish Committee of Representatives of Persons with Disabilities (CERMI)[125] maintains a fierce defence of the use of the term disability, and since the publication of the document 1/2017 on style rules of expression and communication of the state, CERMI[126] expresses that "the phrase 'person or persons with disabilities' should always and at all times be used

124. Canimas Brugué, J. (2015). ¿Discapacidad o diversidad funcional?. Siglo Cero Revista Española Sobre Discapacidad Intelectual, 46(2), 79–97. https://doi.org/10.14201/scero20154627997

125. https://www.cermi.es/

126. https://www.sindromedown.net/wp-content/uploads/2017/10/NORMAS-DE-ESTILO-DEL-CERMI-ESTATAL.pdf

to refer to this sector of citizenship, and 'disability' to refer to their personal and social reality". In its recent legal study[127] published in 2021, it insists that the appropriate expression to refer to the group is person with disabilities as opposed to other terms that "make them invisible and correspond to paternalistic and euphemistic attitudes".

Although the inclusion of people with disabilities in science communication and dissemination activities is something that has been developing more intensively in recent years, the truth is that, until very recently, it was common for institutions to offer activities for these groups with little or no consideration for their opinions or needs. Fortunately, the projects presented in this book show us a stimulating change in the trend that is becoming generalised as regards the inclusion of the different groups of people with disabilities in the processes of social communication of science, to the extent that, by proactively involving these people, the result is not only that the dissemination actions are covering a wider spectrum of society, but also that the dissemination reaches a greater number of people.

In Spain, fortunately, there are more and more proposals that involve people with disabilities in knowledge transfer processes, through different strategies implemented by both the public sector (calls for proposals, grants, etc.) and the private sector, including, of course, the associative movement. Most of the practices arise from civil society, either through voluntary actions in associations that are transformed into projects financed and executed in the long term, or from institutional organisations that direct their dissemination initiatives at groups that have usually not been covered by them. On other occasions, it is the researchers themselves who, based on their own experience as people with disabilities, offer **practical solutions** on how to incorporate inclusive strategies in dissemination actions.

127. Gascón-Cuenca, A., Padilla, I. B., Azcón, A. H., Miralles, A. R., Trigo, A. M., Cameros, C. E. M., ... & Alcaide, Y. G. El ordenamiento jurídico español y las personas con discapacidad: entre la autodeterminación y el paternalismo. Clínica Jurídica per la Justícia Sociall Informes, 1(1). https://ojs.uv.es/index.php/clinicajuridica/article/view/20868/18529

1. Astroaccesible

Astroaccesible[128] is a project which is patently inclusive and chiefly aims to make such an a priori visual science as astronomy accessible to blind or visually impaired people. The traditional popularisation of astronomy has been based on eminently visual content which does not allow visually impaired or blind people to access this knowledge. The Accessible Astronomy project strives to demonstrate with facts that the dissemination of astronomy among blind and low-vision people is possible, putting within their reach concepts and descriptions of the nature of the Universe that are understandable far beyond their visual perception through the delivery of conferences or workshops, the development of adapted materials and the collaboration with entities and people to achieve a greater awareness in the development of adapted content for the dissemination of astronomy.

Examples of these actions include the development of didactic and informative materials such as the construction of three-dimensional models of celestial bodies through 3D printing, hemispheres with stars and constellations, sheets with relief and Braille writing and a series of other tools that make it possible for people to understand concepts and descriptions comprehensible in ways that go far beyond their visual perception. Another of the project's lines of work has to do with the so-called 'Audible Universe'[129], which uses elements of sonification to apply them to the field of astronomy. This line is being developed with researchers in the field of sonification computing, sound and music, experts in sound perception and design and professionals in the field of education and aims to apply sounds to the study and dissemination of astronomy, both for the visually impaired and for anyone else.

128. Manager/contact: Enrique Pérez Montero: epm@iaa.es. Instituto de Astrofísica de Andalucía - CSIC
Principal purpose: To teach and disseminate astronomy to everyone using alternative, but complementary, tools and resources to the sense of sight, which allows access to this science for blind and visually impaired people and improves the transmission of scientific concepts to all audiences regardless of their abilities. It also aims to encourage people with disabilities to embark on scientific careers and to encourage science communicators and scientists to make their work more inclusive.
Project link: http://astroaccesible.iaa.es/

129. http://astroaccesible.iaa.es/content/el-universo-audible-afinando-los-sonidos-para-ampliar-la-astronom%C3%ADa

The recognition of and support for *Astroaccesible* activities by many organisations have been constant since its inception. However, it has had the support of the Spanish Society of Astronomy (SEA) since 2015 for the implementation of activities in ONCE centres or for the printing of accessible material since 2018. The results of these actions have been presented at all SEA's scientific meetings since 2014 and in the publication of two articles in its biannual newsletters[130].

The Spanish National Research Council (*Consejo Superior de Investigaciones Científica*s - CSIC) has also provided support through different projects linked to *Astroaccesible* for the organisation of inclusive visits to the Calar Alto Astronomical Observatory[131], as well as participation as a project leader speaker in four editions of the Course on Scientific Culture and Communication and in the publication of the Blog "Ciencia para llevar" (Takeaway Science)[132]. During 2015, a project by Fundación Española para la Ciencia y Tecnología (FECYT) was also awarded for the project Accessible Agronomy Astronomy (FCT-15-9867) in collaboration with the Experimental Station of Zaidín (EEZ-CSIC), and with a transversal nature to apply many strategies to other branches of science.

As one of the aims of the project is to encourage other disseminators to make their work more inclusive, the activities and resources used are all available on its website[133]. The project is centred on the *Instituto de Astrofísica de Andalucía* (IAA), but all of its face-to-face and virtual activities are made in accordance with the organisation of events by organisations, associations and educational centres in any field, with or without the presence of people with disabilities.

130. Divulgación inclusiva de la astronomía, ¿es posible? Boletín Sociedad Española de Astronomía, December 2016 http://astroaccesible.iaa.es/content/divulgación-inclusiva-de-la-astronom%C3%ADa-¿es-posible
Un Universo de talento. Los beneficios de la divulgación inclusiva. Boletín de la SEA, December 2019 https://www.sea-astronomia.es/boletin/un-universo-de-talento-los-beneficios-de-la-astronomia-inclusiva

131. https://www.caha.es/es/

132. ¿Cómo suena un agujero negro? Blog "Ciencia para llevar", December 2019. https://blogs.20minutos.es/ciencia-para-llevar-csic/2019/12/19/como-suena-un-agujero-negro/

133. http://astroaccesible.iaa.es/

2. *Ciencia con Diferencia* (Science With Difference): Valladolid Science Museum's Accessibility Plan

Ciencia con Diferencia[134] is a project belonging to the Accessibility Plan of the Valladolid Science Museum (MCVa) that helps to create greater social awareness around the inclusion of people with disabilities and carries out specific initiatives aimed at people with disabilities of any kind to overcome the main obstacles they face in their daily lives in general and in access to culture, particularly science. The aim is to employ small actions (such as the architecture of the museums themselves, or the inclusion of pictograms, Braille, or easy reading, among others) to change the situation of vulnerability that these people suffer throughout their lives and to facilitate their experience of enjoying science both in the Museum and outside, taking into account everyone's fundamental right to access culture.

This project has gained ample evidence and recognition, and represents a clear example of how to make it possible for culture (in this case scientific culture) to reach all people on equal terms and under the banner of inclusion, something that all public institutions should consider in order to achieve an increasingly inclusive and diverse society. When the adapted planetarium programme 'Evolution' was launched in 2011, several Spanish planetariums, such as the one in Huesca and the Parque de las Ciencias in Granada, expressed their interest in screening it or producing their own adapted shows. There is no record of other actions of theirs having been replicated in other centres or having served as inspiration for them, but many of these initiatives have been and are being implemented by other institutions. As a centre belonging to the Municipal Foundation for Culture, the MCVa has a municipal subsidy from which it allocates a budget and staff to the *Ciencia con Diferencia* project.

As associative collaboration, it is worth highlighting the collaboration agreements and agreements established with institutions such as ONCE, FAPSCL, CESYA, UVA,

134. Manager/contact: Beatriz Gutiérrez Alberca, gutierrez@museocienciavalladolid.es, Educational Programmes Coordinator, MCVa – Fundación Municipal de Cultura. Inés Rodríguez Hidalgo, irh@museocienciavalladolid.es, director, MCVa – FMC.
Principal purpose: To promote the implementation of specific actions to adapt both the museum's facilities and its exhibition and educational offer to all the groups that make up society, regardless of their physical, mental or sensory faculties and the place where they are located.
Link to the project: https://www.museocienciavalladolid.es/publico-con-necesidades-especiales/

ASPAYM, the Easy Reading Association of Castile and León, educational classrooms in the hospitals of Valladolid, La Milagrosa and Santa Florentina schools in Valladolid, the Penitentiary Centres of Castile and León, the Complutense University and the Carlos III University of Madrid, among other entities, to carry out the different actions that form part of the project.

All actions have been designed to facilitate access to science for a certain target public, diverse in their abilities, after identifying their needs and the resources to meet them. These people are the participants and protagonists of the project's activities, both individually and through their associations, and their opinion and degree of satisfaction allows us to evaluate and improve the offer.

Ciencia con Diferencia is a living project in continuous evolution which is expanded every year and is evaluated by the Valladolid City Council's Municipal Council for People with Disabilities, which collects all initiatives, action plans, participation data and suggestions for improvement in this area.

3. Geodivulgar: Geology And Society

Geodivulgar: Geología y Sociedad[135] is an interuniversity and international project (Spain and Portugal) that works on the dissemination of Geology to all kinds of groups. It includes members from four universities in Madrid (UCM, UAH, UAM and URJC) and one from Castile and León (UL), as well as the University of Coimbra. The project places special emphasis on effective outreach to groups with disabilities: in addition to working with students with intellectual disabilities in occupational centres, they carry out activities with people with deafness, blindness and/or deaf-blindness, in collaboration with the *Asociación Ciencia sin Barreras*[136], (Science without Barriers Association), trying to involve other public and private organisations and establishing links with other projects such as *Divulgación Científica sin Exclusiones* (Scientific Dissemination without Exclusions).

135. Manager/contact: Alejandra García Frank, agfrank@ucm.es; Facultad Ciencias Geológicas, Complutense University of Madrid. Principal purpose: The philosophy of the project is that access to education is a fundamental human right and must be available to all people, and that through informative actions geology can be brought closer to all kinds of audiences, with special attention to the group of people with disabilities.
Link: https://www.ucm.es/geodivulgar/

136. https://www.ucm.es/geodivulgar/asociacion-ciencia-sin-barreras

The involvement of former participants with disabilities as monitors of new activities involves specific training, such as that carried out with the rest of the students in the project, so that all parties are perfectly trained at the start of the dissemination activity.

A large part of the results obtained have been presented in different forums (informative talks, conferences on good university practices, national and international congresses) which have generated various national and international publications at a teaching, scientific and dissemination level [137] that have been awarded several prizes and acknowledgements[138], more specifically, those activities related to the dissemination of geology carried out by the associations Science without Barriers and APAMA (the Alcobendas Association of Parents and Students with Disabilities), which are organised by Geodivulgar. One example is the easy-to-read worksheets that have been made within the *Encaja las Piedras*[139], project, organised by the Instituto de *Geociencias* (a joint centre between CSIC and UCM), in collaboration with Geodivulgar, and funded by the Fundación General CSIC in its 2019 call of the *Cuenta la Ciencia* programme.

Geodivulgar continues to design new workshops and activities, achieving ever greater inclusion by developing materials under the Universal Design for Learning (UDL) approach. There is also collaboration with the Mexican Institute of Water Technology (IMTA)[140] in the magazine it publishes, *Agua Simple*, in which advice is given to international secondary schools that publish in the magazine, and APAMA students have been put in contact with the publication to also participate and write informative texts on easy reading. Moreover, it collaborates with various organisations with a view to achieving greater diversification in the dissemination of geology.

The project's approach is bottom-up as it starts by organising an action with a specific group, and when it is found to work it is offered to more structured organisations to share experiences. This project is based on joint work between different types of organisations: public university and pre-university centres,

137. https://www.ucm.es/geodivulgar/materiales-generados
138. https://www.ucm.es/geodivulgar/premios-recibidos
139. https://www.ucm.es/geodivulgar/encaja-las-piedras
140. https://www.gob.mx/imta

OPIS, special education centres, associations, as well as groups with different types of disabilities.

The activities with the stakeholders involved have been carried out continuously since 2012, as new requests constantly arise. The collaboration with the *Asociación Ciencia sin Barreras* (Science without Barriers Association) and APAMA allows for this temporary continuity. There has also been collaboration on several occasions with the Office for the Integration of People with Disabilities (OPID), from the UCMd+i Diversity and Inclusion Support Unit, so the group interacts with other organisational parts of the University. Furthermore, they have been invited to participate in various events organised by the Disability Care Area of the Office of Solidarity Action and Cooperation (UAM), in the UNESCO Chair of Geoparks, to discuss the inclusivity of geo-tourism in Portugal, to participate in the Escorial Summer Courses in a round table of the Course 'Cognitive Diversities: Science as a Vehicle for Inclusion', as well as to internationalise inclusive methodological proposals in institutions such as the Mexican Institute of Water Technology. Likewise, activities have been designed for ONCE members and their families, also including people with deaf-blindness, and for the first time, in 2017, an Inclusive Geoloday was held with the help of the Spanish Society of Geology [141] where the adapted materials have been particularly well received by all types of public, not only by people with some type of disability. Given the broad acceptance, a new inclusive field trip proposal was organised for the Geoloday Madrid 2019, in which ONCE members in Madrid, together with people of all ages, were also able to learn about the Geological Heritage of the Sierra de Guadarrama National Park and the Geological Park of the Lozoya and Jarama valleys: Puerto de Canencia and the Valdemanco Lagoon.

141. Fesharaki, O., García-Frank, A. (2018). Agua y Patrimonio: un Geolodía inclusivo en la Comunidad de Madrid. Conference: V Congreso Internacional de Docentes de Ciencia y Tecnología. Madrid (Spain) DOI:10.5281/zenodo.1187022

4. PDICIENCIA. Intellectual disability and scientific communication

PDICIENCIA[142] is an interdisciplinary scientific communication project carried out by a diverse team in which people with intellectual disabilities are directly involved, which means making their presence visible and normalised in these and other fields. Carried out by AFAMP[143], the project seeks the participation of new audiences usually distanced from scientific-technical environments, to promote their access and interest in science and innovation in a creative and entertaining way through audio-visual programmes of inclusive scientific dissemination collected on its website[144]. In addition, these people are professionally trained through their involvement in all processes of creating informative, artistic, audio-visual and digital content, involving them in an interest in science and technology and contributing value and scientific knowledge to society.

The social impact of the project has a great deal of scientific evidence, not least the study carried out and the results obtained in terms of improvement in the quality of life of people with intellectual disabilities who participate in it[145], according to the D*imensions of Quality of Life of Schalock and Verdugo* (2007)[146]. Equally remarkable is its participation in several national and international[147] forums and congresses, as well as the awards and recognitions obtained[148], among which we can highlight the PRISMA Casa de las Ciencias 2020 Award for Dissemination, to the best singular project of scientific dissemination "for

142. Manager/contact: Diego Ortega Alonso. Asociación de Familiares y Amigos de Personas con Discapacidad Intelectual AFAMP. info@diegortegalonso.com
Principal Purpose: To disseminate knowledge and scientific culture from a perspective of accessible and inclusive science, making visible the capabilities of people with intellectual disabilities through their active participation in educational, scientific and research activities in order to achieve their full inclusion.
Link: https://pdiciencia.com

143. https://afamp.org

144. https://pdiciencia.com/programas

145. Ortega-Alonso, D., & de Castro-López, M. E. (2021). Ciencia inclusiva, cine y creatividad: herramientas para mejorar la calidad de vida de las personas con discapacidad intelectual. Siglo Cero Revista Española Sobre Discapacidad Intelectual, 52(3), 141–161. https://doi.org/10.14201/scero2021523141161

146. Schalock, R.& Verdugo, M. Á. (2007). El concepto de calidad de vida en los servicios y apoyos para personas con discapacidad intelectual. Siglo Cero Revista Española Sobre Discapacidad Intelectual, 38(4), 21–36.

radically favouring diversity and inclusion, giving a leading role to people with other abilities and offering a new way of popularising science", the Andalucía Más Social award from the Andalusian Regional Government and the 2018 Internet Award for the best social innovation, research and entrepreneurship project on the Spanish-speaking Internet, awarded by the Association of Internet Users.

PDICIENCIA has a high degree of replicability. All its content is shared both on the project's website and through social media, and is available for use, carrying out collaborations with other entities and organisations dedicated both to the communication of scientific culture and the inclusion of people with intellectual disabilities in particular and disability in general. Mention should also be made of the collaboration with research groups, UCC+I and with all kinds of entities dedicated to scientific communication or the inclusion of people with intellectual disabilities. In terms of sustainability, the project is funded by the FECYT (four consecutive editions at the time of writing this book)[149], having even been selected in the *La Excelencia* y *La Innovación en la Divulgación Científica* (Excellence and Innovation in Scientific Dissemination) catalogue, the selection of the fifteen most outstanding projects in the FECYT call for grants for the promotion of scientific, technological and innovation culture in 2020[150]. In addition to being accompanied since its inception by permanent volunteer actions that guarantee the implementation of the necessary actions for its execution, in 2019 an SL called AFAMP for Employment was launched, aiming to become a Special Employment Centre for people with disabilities with the aim of working for the employability and social and occupational integration of people with intellectual disabilities, especially in actions of cognitive accessibility,

147. Ortega-Alonso, D. (2020). Comunicación científica inclusiva desde la discapacidad intelectual: el caso de Pdiciencia. Políticas públicas en defensa de la inclusión, la diversidad y el género (121–131). Ediciones Universidad de Salamanca.

    Alonso, D. O. (2020). Comunicación científica inclusiva para mejorar la calidad de vida de las personas con discapacidad intelectual. La divulgación del conocimiento evoluciona: actas del VII Congreso de Comunicación Social de la Ciencia (542–546). Servicio de Publicaciones e Imagen Institucional. Universidad de Burgos.

    Ortega-Alonso, D. (2019). Arte, ciencia y discapacidad intelectual. Libro de Actas del II Congreso Virtual Internacional y IV Congreso Iberoamericano sobre recursos educativos innovadores. Universidad de Alcalá.

148. https://www.pdiciencia.com/premios-y-eventos/

149. Project references: FCT-17-11940, FCT-18-13937, FCT-19-15036, FCT-20-16232.

150. https://www.fecyt.es/es/system/files/publications/attachments/2021/02/practicas-innovadoras_1.pdf

the development of audio-visual materials and the adaptation of content and spaces to easy reading. In this sense, one should highlight the project's line of work dedicated to the adaptation of scientific news and content through the *Ciencia Fácil* (Easy Science) magazine[151], the first interactive digital magazine for scientific dissemination in an easy-to-read and audio-written format.

The bottom-up approach is key at the methodological level as the project is based on the premise of incorporating people with intellectual disabilities into the first line of work in processes of creating inclusive dissemination actions, as well as collaborative work between people with different abilities. Moreover, the prospect of the inclusion of people with intellectual disabilities in face-to-face actions with scientists and professionals working in scientific communication is incorporated as a foundational strategy, with this interaction succeeding in making scientists and disseminators understand the need to make science more understandable and comprehensible to all audiences, regardless of their abilities. These actions entail the empowerment of people with intellectual disabilities, insofar as the abilities they have are more important than the disability with which society categorises them.

5. #Protagonizados

This is a long-standing consolidated project[152], heir to previous projects funded by the FECYT[153], whose objectives and philosophy are specifically focused on inclusion in scientific dissemination. The wide diversity of the groups reached (senior citizens, people with intellectual disabilities, gypsies, recently arrived immigrants, people with neurodegenerative diseases, prison population, people with mental health disorders...) helps to make these groups visible so that other science communication and dissemination teams are aware of the need to make science inclusive and accessible.

151. https://www.pdiciencia.com/ciencia-facil/

152. Manager/contact: Millán Mozota, millanm@imf.csic.es, millanmozota@gmail.com, Institución Milá y Fontanals de Investigación en Humanidades del CSIC.
Principal Purpose: Bringing science and critical scientific thinking to those collectives we call forgotten, those we do not usually think of when planning and carrying out dissemination actions.
Project link: https://cienciainclusiva.wordpress.com/

153. References: FCT-13-6944, FCT-16-10722, FCT-17-11972, FCT-18-13183, FCT-20-16127.

Its working philosophy is closely linked to know-how (learning by doing and developing working methods and techniques), innovation and the critical evaluation of results to learn from successes and mistakes. The work has led to the publication of more than a dozen articles in national and international academic journals, as well as numerous contributions to congresses and scientific meetings, which are included in the bibliography of this book. It has also published informative articles in prestigious, high-impact media such as the Spanish edition of The Conversation[154]; appeared on television, radio, digital and printed press, given numerous interviews with the people involved in the project, and has even carried out a Master's Final Project on Inclusion in Virtual Museums[155].

To ensure the replicability and sustainability of the project, several tools have been used, including: 1) the detailed publication of the principles, methods, techniques and know-how that structure the actions developed in scientific articles and publications; 2) the act of making all tools and experience available to colleagues and students through the scientific dissemination courses in which they participate; 3) the continuous search for sustainable and self-managed sources of funding; and finally, 4) continuous innovation in tools and methods to prevent the work from becoming obsolete or "always repeating the same thing", so that it remains attractive to participants, disseminators and researchers and participants.

The bottom-up approach is one of the keys to the project's working methodologies, assuming that those actions and activities in which the 'public' becomes the protagonist and makes the activity their own are the ones that work best according to accumulated experience, and involve a much greater commitment from the participants, producing much more long-term results, and turning these people into agents of dissemination. In addition, this approach breaks down the prejudice that certain people or groups are not able to understand science or have no interest in these areas and entails significant empowerment for them.

154. https://theconversation.com/una-ciencia-democratica-es-una-ciencia-inclusiva-162685
https://theconversation.com/la-divulgacion-cientifica-en-personas-con-alzheimer-172645?fbclid=IwAR1N3zAAbJh6hp2YuO29vrqwC2mCdDLZ_q1LQDHI3vBJFgEF7XJVjDQheg4

155. https://cienciainclusiva.wordpress.com/2021/10/06/la-accesibilidad-de-los-museos-virtuales-tfm-de-nidia-aliseda/

LGBTI+ Persons Area

Gracia Trujillo Barbadillo

The successful actions collected here contribute to the dissemination of science to (and by) LGBTI+ groups and individuals traditionally excluded from the academic and scientific sphere in general. Even today, despite the social and legal advances made in recent years[156], not having heterosexual sexual and affective relationships, being trans*[157], a non-binary person, etc., means facing a series of prejudices and stereotypes, discrimination and violence, loss of rights, and less social legitimacy and visibility in general (with the consequent requirement of 'coming out' not always easy, at work, in the family, etc.). This analysis includes, as it could not be otherwise, an **intersectional perspective**[158]; that is, the way in which gender and sexuality variables intersect with other variables such as social class, age, race, ethnicity, ability, etc.

The actions collected here are relevant both because of the scientific production on and by LGBTI+ people that they generate and their dissemination, and because they constitute per se **spaces for meeting and networking** in an academic environment that is still hostile or not very open to these issues. This must be added to the fact that, in general, congresses and many other academic spaces have little or no accessibility to people who are not part of the academy due to

156. See Calvo, Kerman y Trujillo, Gracia. 2011. "Fighting for Love Rights. Claims and strategies of the LGBT movement in Spain", Sexualities, Sage Publications (London), vol. 14 (5): 562–579.

157. I use the term trans* here, with an asterisk, to refer to both transgender and transsexual people.

158. Crenshaw, Kimberlé W. (1991): Mapping the Margins: Intersectionality, Identity Politics, and Violence against Women of Color, Stanford Law Review, Vol. 43, No. 6., 1241–1299.

their specialisation, lack of resources, etc. In addition to the research projects listed here, which go deeper into promoting the inclusion and dissemination of LGBTI+ issues at an academic and social level in general, training for teachers (and other professionals in areas such as health or the media, among others) is also very important. Moreover, there are actions aimed at raising awareness in society about the multiple differences in relation to **gender identities and expressions,** and the violence suffered by those who do not fit into cis-heteronormative models in childhood and adolescence. Preventing violence against LGBTI+ and non-binary people at an early age is key to contributing both to eradicating it and to the advancement and improvement of society in general.

1. Cruising the Seventies (CRUSEV)

Cruising the Seventies: Unearthing Pre-HIV/AIDS Queer Sexual Cultures (CRUSEV) is a European research project funded by the Uses of the Past Programme of the Humanities in the European Research Area (HERA) funding network, and by the European Union's Horizon 2020 Programme[159]. This four-year project (2016–2019) has contributed to overcoming the exclusion of LGBTI+ people, both in academia and at a general social level, by introducing less commonly considered social groups (such as lesbians or trans* and intersex people), and spaces beyond large cities such as Madrid or Barcelona, into research. The central objective of the project was to trace experiences and cultures prior to HIV-AIDS, analysing not only the political, social and legal repression experienced by gays and lesbians, but also their survival strategies, spaces for socialisation, artistic expressions, etc. This analysis provides many keys to understanding very relevant social issues in the current context, such as the survival of homophobic discourses and attitudes. At the same time, learning about the historical trajectories of discriminated social groups helps to generate a sense of collective identity (understood as a set of shared elements) and community, and to generate spaces and support networks.

The activity of the Spanish team was developed through the organisation of seminars and meetings, the curatorship of exhibitions and film cycles and several

159. IP: Glynn Davis (The University of Edinburgh). IP Spanish team: José Antonio Suárez (Universidad de Murcia) https://www.crusev.ed.ac.uk/

publications, including two monographs[160]. The first of the events organised by the team was the seminar *Millones de perversas. La radicalidad sexual de los años 70* (26 and 27 June 2017, Centro Cultural Conde Duque and CentroCentro, Madrid). This activity was part of *El porvenir de la revuelt*a, an extensive programme of events funded by Madrid City Council to celebrate forty years of sexual liberation activism in Spain. The first visible action of this activism was the demonstration against the Law of Dangerousness and Social Rehabilitation (LPRS) and for the rights of gays, lesbians and trans* people that took place in Barcelona in June 1977. The seminar was organised around three thematic axes: networks of affection, militancy and poetics. It combined performances, mediation actions, presentations and round tables to explore some of the central issues of the 1970s, such as the connection of the politics of the sexual liberation movement with other forms of activism, lesbian writing, the memory of Francoism, and the scope of the LPRS and its contestation. Within this same framework was the exhibition *Nuestro deseo es una revolución. Imágenes de la diversidad sexual en el Estado español* (Our Desire is a Revolution. Images of Sexual Diversity in Spain [1977– 2017]).

The group's second activity was the *Resistencias del Sur International Congress.* Uses of the Past, Peripheries and Spaces of Sexual Liberation (27–29 April 2018, *Institut Valencià d'Art Modern*-IVAM), a multidisciplinary event in which various methodological options were put into practice. One of the main lines of work at the congress was the study of activism and sex-dissident culture in the peninsular peripheries, especially in Andalusia and Valencia. And the third and last public activity of the project was the session *Cruising the Seventies*, a 1970s LGBTI+ Revival, which took place at the Reina Sofía Museum on 14 February 2019, and in which several members of the team presented the research they were carrying out as part of the project. Something to highlight about this project is that, after its completion in 2019, it has continued to generate activities such as exhibitions, round tables, etc.

The project activities were carried out in both academic and non-academic spaces, in both cases open to the public, including activist groups at the local

160. The two monographs were: Trujillo, Gracia y Berzosa, Alberto (eds.) 2019. Fiestas, memorias y archivos. Política sexual disidente y resistencias cotidianas en España en los años setenta. Madrid: Brumaria, 477 pages; and Berzosa, Alberto, Suárez, J.A, Platero, L. y Trujillo, Gracia (eds.) 2019. Reimaginar la disidencia sexual en la España de los setenta. Barcelona: Bellaterra.

level (such as museums, exhibition halls, bars, social centres, etc.). This made it possible to share and disseminate on a wider level what was being done in the framework of the project, which was also helped by its presence on social media and on the Internet[161].

2. Diversity and childhood

European project funded by the *European Union's Rights, Equality and Citizenship Programme* (2014–2020)[162]. The project consisted of the implementation and dissemination of a set of actions aimed at raising awareness in society about diversity in gender identities and expressions, and the violence suffered by those who do not fit into heteronormative models in childhood and adolescence.

The educational sphere is central to this, but it is not the only sphere to be addressed. The project activities target a wide range of areas, levels and stakeholders (authorities, professionals and family) with different economic, professional and educational backgrounds. Transnational networks (academic and activist) have been used for the implementation of the project activities and their dissemination whenever possible, as stated on the project website.

LGBTI+ and gender non-conforming children still face social and institutional violence because they do not fit into gender and sexual binarism given that they have different gender identities and expressions, sexualities, etc. The project analyses the prejudices, stereotypes, norms, attitudes and social behaviours that can lead to justifying and/or activating different forms of violence against LGBTI+ minors.

The aim of the project is to analyse a set of spaces in which, in general, non-heterosexual and non-binary experiences and visions of childhood are not considered. It seeks to study the educational sphere, in addition to health, public spaces, families and the media, and aims to change social behaviours towards sexual and gender diversity in childhood, as well as their agency strategies (i.e. people's capacity or ability to change structural conditions).

161. Facebook account: https://www.facebook.com/cruisingthe70s. Twitter profile: https://twitter.com/cruisingthe70s. Instagram: @cruisingthe70s

162. Coordinator: Josan Langarita (University of Girona). https://www.diversityandchildhood.eu/

The project, with a two-year duration (2019–2021), has been carried out in nine different countries by ten institutions: Belgium (Cavaria), Croatia (Zagreb Pride), Greece (KMOP), Hungary (Háttér Society), Lithuania (the Lithuanian Gay League), Poland (Lambda Warsaw), Portugal (Centre for Social Studies-University of Coimbra), Slovenia (University of Ljubljana) and Spain (University of Barcelona and University of Girona).

The different teams have worked on the creation of a mobile application for children and a handbook for professionals. The project has integrated professionals from different fields, LGTBI groups from the countries analysed, and, in this way, has managed to reach different audiences by using their presence on social networks[163]. The final goal is to create a series of tools that can be applied to generate good practices that can be replicated in other European countries and even beyond the framework of the European Union.

The mobile application, available for Android and iOS devices, can be downloaded free of charge from both Google Play and the Apple Store, under the name Diversity and Childhood. The app is available in ten languages (Greek, Polish, Hungarian, Spanish, Dutch, English, Portuguese, Lithuanian, Lithuanian, Slovenian and Croatian). For each age group (6-10; 11-14; 15-18) there are a series of frequently asked questions that were developed by the consortium and tested through workshops with children in seven countries[164].

The handbook for practitioners is based on the results of their fieldwork. The first version of the handbook was written by members of the Hatter Society in Hungary, followed by a second version with comments and suggestions from all participants, and a final version with comments and suggestions from the external committee of experts[165]. The final version was translated into ten languages and has been disseminated in the project's training sessions, as well as through the website and social media. They have received positive feedback on the Guide but have not yet evaluated its impact[166].

163. https://www.facebook.com/diversityandchildhood (1,344 followers)
Twitter https://twitter.com/Childhood_LGBTI (272)

164. Application: https://play.google.com/store/apps/details?id=com.diversity.app&gl=ES

165. https://www.diversityandchildhood.eu/team2.

166. Manual: https://www.diversityandchildhood.eu/handbook
Internal Project Reports: https://www.diversityandchildhood.eu/project-reports
Training guides: https://www.diversityandchildhood.eu/training-and-workshop-modules

3. Intimate

Citizenship, Care and Choice: The Micropolitics of Intimacy in Southern Europe (Intimate) is a European project, coordinated by the Centro de Estudos Sociais (CES), University of Coimbra, and funded by the European Research Council (2014–2019)[167]. LGBTI+ people, their sex-affective relationships and their families still face today a series of prejudices, stereotypes and violence of different types, and in various fields (health, education, media, public space in general). The aim of the project was to contribute to the legal, political and cultural advancement of this social group through an empirically based comparative study between Spain, Portugal and Italy designed to rethink non-(hetero) normative 'intimate citizenship', the field of care and the right to choose.

For the analysis of the three case studies, a group of researchers (two for each country) and advisors were selected for the three phases of the project: 1. The topics included in the project were quite novel: same-sex couples (with a special focus on lesbians), polyamorous relationships, assisted reproduction and surrogacy, the politics around naming a child, trans* people and care, and living with friends in later life.

Project outputs include a wide range of publications aimed at both academic and non-academic audiences; thematic conferences and research seminars; summer schools; project internships; and guides for public policy, including education. One of the activities carried out by project participants was a series of talks in secondary schools in Coimbra. The results of the project are available for consultation on the project website[168].

In both cases (research and consultancy group), the people chosen had eventually been or were participating in feminist and LGBTI+ political groups

167. IP: Ana Cristina Santos (CES, University of Coimbra), https://www.ces.uc.pt/intimate/

168. Project publications are listed here: https://www.ces.uc.pt/intimate/index.php?id=10437&id_lingua=4&pag=10455
The team's presentations at conferences:
https://www.ces.uc.pt/intimate/index.php?id=10437&id_lingua=4&pag=10454

You can also consult the events organised in the framework of the project:
https://www.ces.uc.pt/intimate/index.php?id=10437&id_lingua=4&pag=10440

when joining the project[169] and continued to participate in networks and activist groups during it. This made it possible to connect with these groups and to disseminate in a remarkable way the activities carried out throughout the project, the publications, and all those events which the research staff participated in and/or organised.

In the three countries, the project team generated an outstanding collaboration with LGBTI+ groups. The team's activity has continued in the form of different collaborations, publications and initiatives beyond the end date of the project. Part of the Intimate team has continued with research in the ILIA LGBTQI+ Lives project, funded by the European Agency NORFACE, with a duration of three years (2019–2021), focusing this time on the case of Portugal[170].

The dissemination of Intimate was through an attractive website, on which all the information, activities and results of the project were posted, together with press releases mentioning the project or dealing with LGBTI+ issues[171].

4. Abrazar La Diversidad (Embracing Diversity): Proposals for an education free of homophobic and transphobic harassment

These are free training seminars on sexual, family and gender identity diversity in educational contexts, based on the guide *Embracing diversity: Proposals for an Education Free of Homophobic and Transphobic Bullying*[172]. This guide is based on a review of more than 250 teaching materials and the document was contrasted in focus groups with education professionals, trade unions, representatives of administrations, as well as associations and groups. The seminars are organised by the 'Anthropology, Diversity and Coexistence' research group from the Complutense University of Madrid[173].

169. https://www.ces.uc.pt/intimate/index.php?id=10437&id_lingua=4&pag=10780
170. https://www.norface.net/project/cilia/
171. In addition to the website, it has also used Facebook for dissemination, where it has 1,965 followers: https://www.facebook.com/ces.intimate
172. Manager/contact: José Ignacio Pichardo (UCM). https://cutt.ly/KwgEAkT
173. https://www.ucm.es/ginadyc/

The educational field has a series of pending challenges in relation to LGBTI+ students, teachers and families, and the stereotypes and prejudices, discrimination and harassment that they may suffer, among other issues. The guide and training include concepts, legislation, educational proposals, etc., and have generated a series of spaces for exchange and networking among teachers[174].

This initiative has been running since 2015 and is financed by the European Social Fund. The trainings are free of charge and the materials can be practically applied by teachers in classrooms and academic environments in general. The latest editions have been convened through the General Directorate for Sexual Diversity and LGTBI Rights (Ministry of Equality), while conferences have been held in Valladolid, Alicante, Cáceres, Málaga, Las Palmas de Gran Canaria, Saragossa, Santiago de Compostela, Albacete, Lleida, Madrid, Palma de Mallorca, Logroño, Oviedo and on online platforms. A geographical criterion has been considered when choosing venues in order to facilitate the participation of teachers and education professionals from as many Autonomous Communities as possible. Travel and accommodation allowances are also available for people who are not from the same province as face-to-face training locations.

Each seminar lasts twelve hours and is aimed at teachers, members of management and guidance teams, advisors from teacher training centres and other educational administrations and those responsible for educational administration in all Autonomous Communities, Ceuta and Melilla. These training sessions are certified by the Ministry of Education and Vocational Training (valid credits for six-year teaching periods). In order to facilitate access to these training courses, they are online and face-to-face, and also offer limited travel grants for people who are not from the same province.

The training courses include the experiences and work of teachers, researchers and LGTBI collectives at a local level, and have featured the collaboration of the Federation of LGBTI+ Collectives at a national level, among others. Dissemination

174. The training sessions also include the results of research such as “Diversity and coexistence in educational spaces” (“Diversidad y convivencia en los espacios educativos), as well as other materials that have been the result of qualitative research, such as the teaching guide “We are diversity” (“Somos diversidad”), collectively produced by some thirty educators for INJUVE and the Ministry of Equality.

is carried out through networks, but the greatest impact is in training and exchanges between teachers and guidance teams[175].

5. MariCorners

This is an academic forum for the exchange, promotion and dissemination of queer research, impressions and realities. In October 2021, its II *International Congress of Interdisciplinary LGTBIQ+ Studies was held in Spanish*[176]. Researchers who analyse LGBTI+ and queer issues need meeting and networking spaces (both physical and interdisciplinary) as the academic environment remains, in general, hostile, or not very receptive to these research topics. The MariCorners Congress arose, in fact, in the absence of such a forum in the academy. As the organisers of this forum point out, "the vocation of MariCorners has always been to build bridges between researchers/researchers, disciplines/fields of study and different generations"[177]. There are specific spaces within other conferences, research projects or academic spaces, but they tend to have a specialised thematic focus and are, in general, not very accessible to people outside the academic circuit.

MariCorners is also "a project of symbolic and material occupation. In the face of social and academic hostility to the people, experiences and discourses of LGTBI and queer people, MariCorners seeks a direct, physical occupation of the space, of a university faculty, with our symbols (the unicorn), the name of the association and all the people who participate in the congress". And, on the other hand, through the numerous and diverse research projects, it also seeks to demonstrate the amount and quality of research on LGBTI+ issues.

With the aim of connecting generations and offering rigour and academic quality, the project has a scientific committee of LGBTI+ people from different disciplines, accredited in their speciality and with experience in both research and dissemination practice. In order to avoid a personalistic selection of the proposals,

175. http://www.infocop.es/view_article.asp?id=6024

176. https://maricorners.es/

177. The sentences in quotation marks come from an exchange of emails with the Congress organisers in November 2021.

the evaluation has always been carried out by blind peers, trying to include the greatest possible number of themes, sensibilities and experiences.

This congress has contributed to making research projects visible, generating meeting spaces and creating networks of LGBTI+ people who research in different academic fields, while at the same time challenging the university as a whole (with issues such as inclusive language, for example, or the name of the congress itself). It is an independent, self-managed and non-profit initiative that seeks to give voice and academic legitimacy to research that revolves around LGBTI+ elements. They carry out a final survey open to all participants, encouraging them to evaluate all activities carried out by MariCorners to "improve and include as many voices as possible".

This activity is classified as an accredited activity of free configuration for all students of the university, which means integrating it into the teaching offer of the institution. In relation to sustainability, it should be noted that the cost of the congress for the Polytechnic University of Madrid is low, focusing only on that which is related to the use of space and the printing of posters. The second edition of the Congress (2021) doubled the number of proposals received and almost doubled the number of people registered. After the first edition of MariCorners, two publications were produced: the first one in collaboration with the Egales publishing house, where a series of articles derived from the papers of the Congress were selected by blind peers[178]; the second publication, in collaboration with the Library of the Polytechnic University of Madrid, gathered the rest of the articles derived from the papers of the first MariCorners meeting[179].

MariCorners has established a direct collaboration with the *Rede Galega de Estudos Queer* to establish itself as an association and network in Galicia. They are also currently collaborating with the Equality Unit of the Polytechnic University of Madrid for the elaboration and updating of an Equality Guide on gender and gender-affective orientation for staff and the university.

They participated in the *Challenging Bias Against Women, Girls and the LGBTI Community Global Workshop*, organised by the International Coalition of Sites of

178. MariCorners: investigaciones queer en la Academia, monograph published by editorial Egales (2020)

179. This publication is available online and free of charge.

Memory. During the workshop, they gave a talk on introducing queer perspectives in museums and memory spaces for representatives of institutions from multiple countries. The MariCorners team intervened in the round table Queer Studies and Science, held on 23 June 2019 and organised by the group PRISMA: Partnership for Gender and Sexual Affective Diversity in Science, Technology, and Innovation[180]. Currently, MariCorners is also in the initial process of the LGTBI Memory Network that is being promoted by different activist associations and researchers in Spain.

They have outstanding dissemination in social media (Twitter, Facebook and Instagram) not only in relation to the congress held, but also to other activities of interest on LGBTI+ issues and research; they also carry out a radio programme where they interview LGBTI+ researchers. It has all contributed to this academic and activist initiative becoming a space for meeting, exchange and dissemination of research, projects and initiatives. Both in the podcast, through the section El *Altavoz MariCorners*, and in their social networks[181], they disseminate information to all those who need help with their LGBTI+ research or dissemination projects. For example, in the PRISMA Conference or multiple projects from Final Degree Projects (TFG) and Final Master's Degree Projects (TFM).

180. https://prismaciencia.org/

181. Facebook: https://www.facebook.com/MariCorners-Estudios-Interdisciplinares-Lgtbiq-en-espa%C3%B1ol-1077894652353156 (611 people have said "I like it").
Twitter: https://twitter.com/MariCorners (3,509 followers)

CHAPTER 3:

CHALLENGES

Creating Equitable and Inclusive Science: Historical Developments and Future Challenges

Londa Schiebinger

Governments and universities in Western Europe and North America have taken three strategic approaches to equity and inclusion over the past several decades:

1. **"Fix the Numbers"** focuses on increasing the numbers of women and underrepresented groups in science and engineering.

2. **"Fix the Institutions"** promotes equity in careers through structural change in research organisations.

3. **"Fix the Knowledge"** or "gendered innovations" stimulates excellence in science and technology by integrating sex, gender and diversity analysis into all phases of basic and applied research — from setting priorities, to funding decisions, to establishing project objectives and methodologies, to data gathering and analysing the results, to dissemination.

While we analytically distinguish these three approaches, they are interrelated. We will not fix the numbers until we also fix the knowledge, and vice versa. Each

approach is part of the structural change that must take place across science infrastructures.

Sociologists have identified a "diversity dividend"[182]. **Cultivating diversity — whether gender, socioeconomic, ethnic, sexuality, disabilities, etc. — is the right thing to do from the point of view of social justice, and, under the right conditions, it can also drive innovation.** Women, for example, hold only sixteen percent of US patents. A study from Harvard University's Business School showed that it matters who invents: women tend to invent for women and men tend to invent for men. The authors estimated that had women and men produced equal numbers of patents since 1976, there would be 6,500 more women-focused health technologies today[183]. Team diversity is important; barriers to science and engineering for women and underrepresented groups should be abolished.

But "fixing the numbers" is simply one part of what is needed. In addition to increasing diversity on research teams, we need to "fix the knowledge" by diversifying research methods and research questions asked[184]. Evidence shows that sex, gender and intersectional analysis promotes rigour, reproducibility, excellence and sustainability in science and technology[185]. Importantly, everyone on a team needs to understand how gender, ethnicity and other diversity dimensions might impact research and experimental design. This should not be the burden of women and underrepresented groups. All scientists and engineers need to learn these basic skills.

Methods of sex, gender and intersectional research are well developed[186] [187] [188]. This aspect of diversity is so important that public funding agencies have developed

182. Nielsen MW, Alegria S, Börjeson L, Etzkowitz H, Falk-Krzesinski HJ, Joshi A, Leahey E, Smith-Doerr L, Woolley AW, Schiebinger L. Opinion: Gender diversity leads to better science. Proceedings of the National Academy of Sciences. 2017 Feb 21;114(8):1740-2.

183. Koning R, Samila S, Ferguson JP. Who do we invent for? patents by women focus more on women's health, but few women get to invent. Science. 2021 Jun 18;372(6548):1345-8.

184. Nielsen MW, Bloch CW, Schiebinger L. Making gender diversity work for scientific discovery and innovation. Nature Human Behaviour. 2018 Oct;2(10):726-34.

185. Tannenbaum C, Ellis RP, Eyssel F, Zou J, Schiebinger L. Sex and gender analysis improves science and engineering. Nature. 2019 Nov;575(7781):137-46.

186. Schiebinger L & Klinge I. (Eds.) Gendered Innovations: How Gender Analysis Contributes to Research (Luxembourg: Publications Office of the European Union, 2013).

187. Schiebinger L & Klinge I. (Eds.) Gendered Innovations 2: How Inclusive Analysis Contributes to Research and Innovation (Luxembourg: Publications Office of the European Union, 2020).

policies for integrating this type of analysis into the grant proposal process, where relevant[189]. Since 2003, the European Commission has developed such policies of sex and gender analysis, and has added intersectional analysis in Horizon Europe. Since 2011, the Spanish Ministry of Science and Innovation and Universities has also supported integrating sex and gender analysis into the objectives and methodology of research with the passage of the Science, Technology and Innovation Law. The idea behind inclusive research methods is that if taxpayer money is used, the research **should benefit the whole of society, not just a privileged few.**

Research demonstrates a synergy between team diversity and methodological diversity[190]. A sample of more than 1.5 million medical research papers revealed a link between women's participation in medical science and attention to gender- and sex-related factors in disease-specific research. This study showed that promoting the advancement of women in medicine led to a greater integration of gender and sex analysis into medical research.

What are the social benefits of sex analysis[191] in medicine? Doing research wrong costs lives and money. For example, ten drugs were recently withdrawn from the US market because of life-threatening health effects, and eight of these posed greater threats for women. Not only did these drugs cost billions of dollars to develop, but when they fail, they cause death and human suffering.

These drugs failed because the male body has long been taken as the norm, and most research is done on males—whether in cells and tissues, mice, or humans. To remedy this situation, the US National Institutes of Health implemented its requirement that "Sex as a Biological Variable" be included in all publicly funded research in 2016. This means that drug development must include

188. Schiebinger L, Klinge I, Sánchez de Madariaga I, Paik HY, Schraudner M, and Stefanick M. (Eds.) Gendered Innovations in Science, Health & Medicine, Engineering and Environment. 2021, Methods: http://genderedinnovations.stanford.edu/methods-sex-and-gender-analysis.html

189. Hunt L & Schiebinger L. Sex, Gender, and Diversity Analysis in Research Policies of Major Public Granting Agencies: A Global Review, in preparation.

190. Nielsen MW, Andersen JP, Schiebinger L, Schneider JW. One and a half million medical papers reveal a link between author gender and attention to gender and sex analysis. Nature human behaviour. 2017 Nov;1(11):791-6.

191. Schiebinger et al. Gendered Innovations, Analyzing Sex, http://genderedinnovations.stanford.edu/methods/sex.html.

representative numbers of male and female animals, men and women, and racial or ethnic minorities (this latter passed by US law in 1993). This allows testing for sex differences in efficacy, toxicity, and safety, and for developing sex-specific dosing or treatments[192].

It is important to remember that sex and gender also interact in disease. Take, for example, COVID-19. On the side of biology or sex differences are potential differences in viral receptor, virus reproduction, antibody production possibly arising from the expression of genes on the X chromosome or hormonal effects. On the side of gender are factors such as the prevalence of smoking (higher in men worldwide), preventive measures such as handwashing (generally lower among men), occupation (women make up a majority of health-care workers), living arrangements, access to and use of health care, testing and protective equipment. We need to understand how sex and gender interact and how these factors intersect with others, such as age and socioeconomic status, to develop more comprehensive strategies for combatting COVID-19[193].

Drug development also requires an intersectional approach[194]. Most drugs are taken by people over 65, yet this group is typically not tested[195]. Similarly, transgender, non-binary and intersex people get sick, but they are rarely included in the test groups. In addition, pregnant people are traditionally excluded from clinical trials because of concerns for fetal safety. Pregnant people, however, may have epilepsy, heart or other conditions that require treatment even while pregnant. Information about drug safety during pregnancy and about effects on the fetus require investigation.

Beyond sex analysis in medicine, we need to consider race and ethnicity. As we learned during the pandemic, pulse oximeters that measure oxygen saturation

192. Schiebinger et al. Gendered Innovations, Prescription Drugs, http://genderedinnovations.stanford.edu/case-studies/drugs.html#tabs-2.

193. Schiebinger et al. Gendered Innovations, COVID-19, http://genderedinnovations.stanford.edu/case-studies/covid19.html.

194. Schiebinger et al. Gendered Innovations, Intersectional Approaches, http://genderedinnovations.stanford.edu/methods/intersect.html.

195. Tannenbaum C, Day D. Age and sex in drug development and testing for adults. Pharmacological research. 2017 Jul 1;121:83-93.

in the blood do not work well for patients with darker skin. These oximeters work by shining infrared light through the finger to measure oxygen levels in the blood. The problem is that both the deoxyhemoglobin in the blood and the melanin in the skin absorb light[196]. An analysis of over 47,000 readings done in 2020 at the height of the pandemic found that oximeters misread blood gases twelve percent of the time in patients with darker skin compared to four percent of the time in patients with lighter skin. This means that patients with darker skin may not have received the supplemental oxygen needed to avoid damage to vital organs, such as heart, brain, lungs and kidneys[197].

Most studies on skin colour in pulse oximetry have not disaggregated data by sex. Questions about the interaction of sex and skin colour remain. A recent study suggested that oximeters erred more often for female patients than for males, though the difference was slight compared to differences related to skin tone[198]. Nonetheless, this means that accuracy for females with darker skin may be the most compromised.

What about technology? Social robots are increasingly employed in health, care and educational settings. As these machines enter our lives, we humans tend to project human social cues —including gender and race — onto these artificial agents. As soon as users assign gender to a machine, stereotypes follow, and social divisions of labour and social hierarchies are hardened, even amplified, by being built into machines. Gendering robots 'female', for example, for what is seen as women's work — jobs that tend to be poorly paid — may reinforce social inequities. The challenge for roboticists is: 1) to understand how gender becomes embodied in robots; 2) to design robots that promote social equity[199] [200].

196. Feiner JR, Severinghaus JW, Bickler PE. Dark skin decreases the accuracy of pulse oximeters at low oxygen saturation: the effects of oximeter probe type and gender. Anesthesia & Analgesia. 2007 Dec 1;105(6):S18-23.

197. Sjoding MW, Dickson RP, Iwashyna TJ, Gay SE, Valley TS. Racial bias in pulse oximetry measurement. New England Journal of Medicine. 2020 Dec 17;383(25):2477-8.

198. Zou J, Schiebinger L. Ensuring that biomedical AI benefits diverse populations. EBioMedicine. 2021 May 4:103358.

199. Schiebinger et al. Gendered Innovations, Gendering Social Robots, http://genderedinnovations.stanford.edu/case-studies/genderingsocialrobots.html#tabs-2.

200. Almendros LS. Las 'mentiras' científicas sobre las mujeres. Revista Iberoamericana de Ciencia, Tecnología y Sociedad-CTS. 2017 Oct 30;12(36).

Take the example of care robots. In the US, 90 percent of nurses are women. Should a care robot be gendered female to meet user expectations? Will patients be more likely to take their medicines or do their exercise? Gendering assistive robots female reinforces the notion that nurses should be women and means that men, who may wish to become nurses, are once again excluded.

Robots can also embody race by using different coloured plastics. Milo, a robot designed for learners with autism spectrum disorder (ASD), is the only robot our team found that is customisable by skin tone — available in whitish and brownish tones. Milo, however, is distinctively boyish. Because autism affects four times as many boys as girls, this robot is, perhaps rightly, portrayed as a male. But it would be important to make a teaching robot for the millions of girls, trans, non-binary, and LGBQI+ young people suffering from ASD (*Acute Stress Disorder*).

This brings us to our final example of how integrating sex, gender and intersectional analysis into science and technology can benefit society and global environmental sustainability. Menstruation is a fact of life for over half the global population. Disposable menstrual products, such as tampons and pads, cost consumers US$ 26 billion globally in 2019. At the same time, 49.8 billion tampons and sanitary pads, plus their packaging, end up in landfills or sewer systems each year in the US. The cost of these products to the consumer and the environment is high[201]. A recent life-cycle assessment demonstrated that menstrual cups, menstrual underwear and reusable pads may be the solution. Menstrual cups, for example, scored 99% lower in environmental impact than disposable products[202]. Menstrual cups are good for the environment because they reduce waste, thus supporting the UN Sustainable Development Goal #6 *Clean Water and Sanitation*.

Menstrual cups are also good for gender equity because they reduce cost and encourage school attendance, especially in middle- and low-income countries, thus supporting the UN Sustainable Development Goal #5 Gender Equality. In collaboration with school-age children in South Africa, Uganda, Kenya and rural India, several studies showed that menstruators preferred cups to pads

201. Schiebinger et al. Gendered Innovations, Menstrual Cups, http://genderedinnovations.stanford.edu/case-studies/menstrualcups.html.

202. Fourcassier S, Douziech M, Perez-Lopez P, Schiebinger, L. Menstrual Products: A Comparable Life-Cycle Assessment, in preparation.

because they were more secure against leaks[203]. This is a win-win. Menstruators pay less for menstrual products over the course of a lifetime and, when they feel protected, they less often dropped out of school, potentially breaking the cycle of poverty.

Europe is not immune to menstrual poverty. In Spain, for example, twenty percent of menstruators live below the poverty line and are unable to afford menstrual products. Spain also currently taxes these products as luxury items. But governments are taking action to abolish this type of 'period-tax, with all European Union countries planning to remove it by 2022. Scotland became the first country to make period products free to all in 2021[204]. The goal of this action is to provide menstrual products to all who need them to secure people's dignity.

What is the road forward? How can societies both fix the numbers and fix the knowledge in ways that enhance diversity, innovation, social equity and environmental sustainability?

What is needed is both bottom-up and top-down action. Bottom-up researchers across numerous fields of science and technology need to integrate sex, gender and intersectional factors into all stages of research or development processes, from strategic considerations for establishing priorities and building theory to more routine tasks of formulating questions, designing methodologies and interpreting data. Many pitfalls can be avoided and new ideas or opportunities identified by designing this type of analysis into research — from the very beginning. Sex, gender and intersectional analyses work alongside other methodologies in a field to provide yet further 'controls' (or filters for bias) providing critical rigour in science, medicine, and engineering research, policy and practice.

Gendered Innovations is a global collaboration that, since 2009, has developed state-of-the-art methods of intersectional analysis. As with any set of methods, new ones will be fashioned and others discarded as circumstances change. The value of their implementation depends on the creativity of the research team.

203. Mason L, Laserson KF, Oruko K, Nyothach E, Alexander KT, Odhiambo FO, Eleveld A, Isiye E, Ngere I, Omoto J, Mohammed A, Vulule, J and Phillips-Howard, PA. Adolescent schoolgirls' experiences of menstrual cups and pads in rural western Kenya: a qualitative study. Waterlines. 2015 Jan 1:15-30.

204. Lennon, M. MSP, Period Products (Free Provision) (Scotland) Bill. 2021. https://www.parliament.scot/bills-and-laws/bills/period-products-free-provision-scotland-bill

There is no recipe that can simply be plugged into research or development processes. Researchers will want to consider all methods and think creatively about how these methods can enhance their own research.

These methods step through the research process (see box). **Rethinking research priorities and outcomes importantly asks:** Whom will the research benefit, and whom will it leave out? Societies have limited resources; where will that money be invested, and whom will benefit?

Intersectional approaches look at how social factors, such as sex, socioeconomic status, gendered division of labour and language, age, disabilities, etc., interact in the proposed research. As the examples above have shown, social factors intersect in ways that can change research outcomes. It is not enough to consider race and ethnicity because often these categories are shaped by a person's educational background, gender or socioeconomic status.

Co-creation and participatory research **emphasises including users in research design to capture their hands-on knowledge, to understand their lifeways and priorities, and to better craft successful outcomes.** This can be important for introducing menstrual cups to sub-Saharan African communities or for developing smart cities across Europe. Greater citizen involvement in knowledge production strengthens democratic societies. Effective communication is a key tool for the development of citizen scientists[205] [206].

Researchers need to be encouraged to adopt sex, gender and intersectional analysis through top-down approaches. To push forward rigorous sex,

Sex, Gender and Intersectional Analyses enhance each step of the research process:

- Rethinking Research Priorities and Outcomes
- Rethinking Concepts and Theories
- Formulating Research Questions
- Analysing Sex
- Analysing Gender
- Analysing how Sex and Gender Interact
- Intersectional Approaches
- Engineering Innovation Processes
- Co-creation and Participatory Research
- Rethinking Standards and Reference Models
- Rethinking Language and Visual Representations

gender and intersectional analysis, interlocking policies need to be implemented by at least three pillars of academic research: funding agencies, universities and peer-reviewed journals[207]. Pillar 1, funding agencies, can encourage integrating sex, gender and diversity analysis into research design at the beginning of the research process. Pillar 2, universities and research institutions, are responsible for developing methods for this type of analysis and for providing this expertise to future generations. Pillar 3, peer-reviewed journals, increasingly incorporate these policies at the end of the process, when selecting manuscripts for publication. *The Lancet*, *Nature*, and *Cell*, among others, have implemented such policies.

Much needs to be done, but together we can cultivate inclusive science that benefits people across all of society while securing the health of the planet.

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ANEXO

Social Impact in Social Media, SISM. Methods and Results.

The work carried out by the team producing the publication *Hacia una comunicación inclusiva de la ciencia: reflexiones y acciones de éxito* (Towards Inclusive Science Communication: Reflections and Successful Actions) (FECYT, 2022) has been complemented with an analysis of the role that people and groups are already playing in the inclusive dissemination and communication of science on social media in each of the four social areas addressed: gender and socio-cultural situation; cultural groups and groups at risk of social exclusion; disability; and LGBTI+ people.

For this specific task, use has been made of the **Social Impact in Social Media (SISM)**[1], methodology, an innovation that was one of the pillars for the preparation of the two reports funded and published by the European Commission in its task of guiding all those doing research in Europe on how to include the social impact dimension in this research, and Applying relevance-assessment methodologies to Horizon 2020[2] and Monitoring the Impact of EU Framework Programmes[3].

This methodology combines quantitative and qualitative content analysis of the sample selected, taking into account the social impact contributions of the research. For the analysis carried out in this work, SISM has been used in the social network Twitter under the guidance of three fundamental objectives:

- To analyse which individual and collective members (in both cases, those who self-identify as such) carry out inclusive science dissemination and communication, in the areas of 1) Gender and socio-cultural situation; 2) Cultural groups and groups at risk of social exclusion; 3) Disability; and 4) LGBTI+ people.

- To provide the groups themselves with a user-friendly tool that enhances their role in the inclusive dissemination of science, making it clearly sustainable.

- To provide institutional decision-makers with accurate information that allows them to assess the importance of developing policies, equipment and actions that promote inclusive science dissemination and communication.

1. Pulido, C., Redondo-Sama G., Sordé-Martí T., y Flecha, R. (2018). Social impact in social media: A new method to evaluate the social impact of research. *PLOS ONE, 13*(8), e0203117. doi:10.1371/journal.pone.0203117
2. Expert Group on Evaluation Methodologies for the Interim and Ex-post Evaluations of Horizon 2020 (2017) *Applying relevance-assessing methodologies to Horizon 2020*. Comisión Europea.
3. Van den Besselaar, P., Flecha, R., y Radauer, A. (2018). *Monitoring the Impact of the EU Framework Programmes*. Oficina de Publicaciones de la Unión Europea. https://op.europa.eu/en/publication-detail/-/publication/cbb7ce39-d66d-11e8-9424-01aa75ed71a1

1. Area: gender and socio-cultural situation

SAMPLE

1. **Who disseminates scientific knowledge in relation to the area of gender and sociocultural situation on social media?** For the analysis of the selection of the sample in the area of gender, the extraction of messages published in the period between 28/09/2021 and 28/10/2021 has been configured with a maximum of 500 Tweets for each search, which have subsequently been unified in a single list. The hashtags combined are: #gender, #evidence, #women, #NoMoreMatilda, #inclusiveScience, #femalescientists, #science, #InclusiveScience, #Diversity and #cicfem.

   The selection of the sample to be analysed from the total number of messages captured are those categorised as evidence, which in the case of gender and science resulted in 80 messages. Of the 80 messages categorised as evidence, those identified with countries other than Spain were eliminated. Once this filter was applied, the final sample of Tweets analysed was 54 messages.

2. **What evidence-based information is disseminated by gender and socio-cultural groups or associations and who does so?** To extract this information, we looked at which organisations published the most evidence-based information. The last 100 messages (a total of 200 messages) from two organisations were then collected.

3. **What evidence-based information is disseminated by people in the area of gender and socio-cultural situation and who does so?** To extract this information, we observed which people in the field under study published the most evidence-based information. The last 100 Tweets and Retweets of these people were then collected.

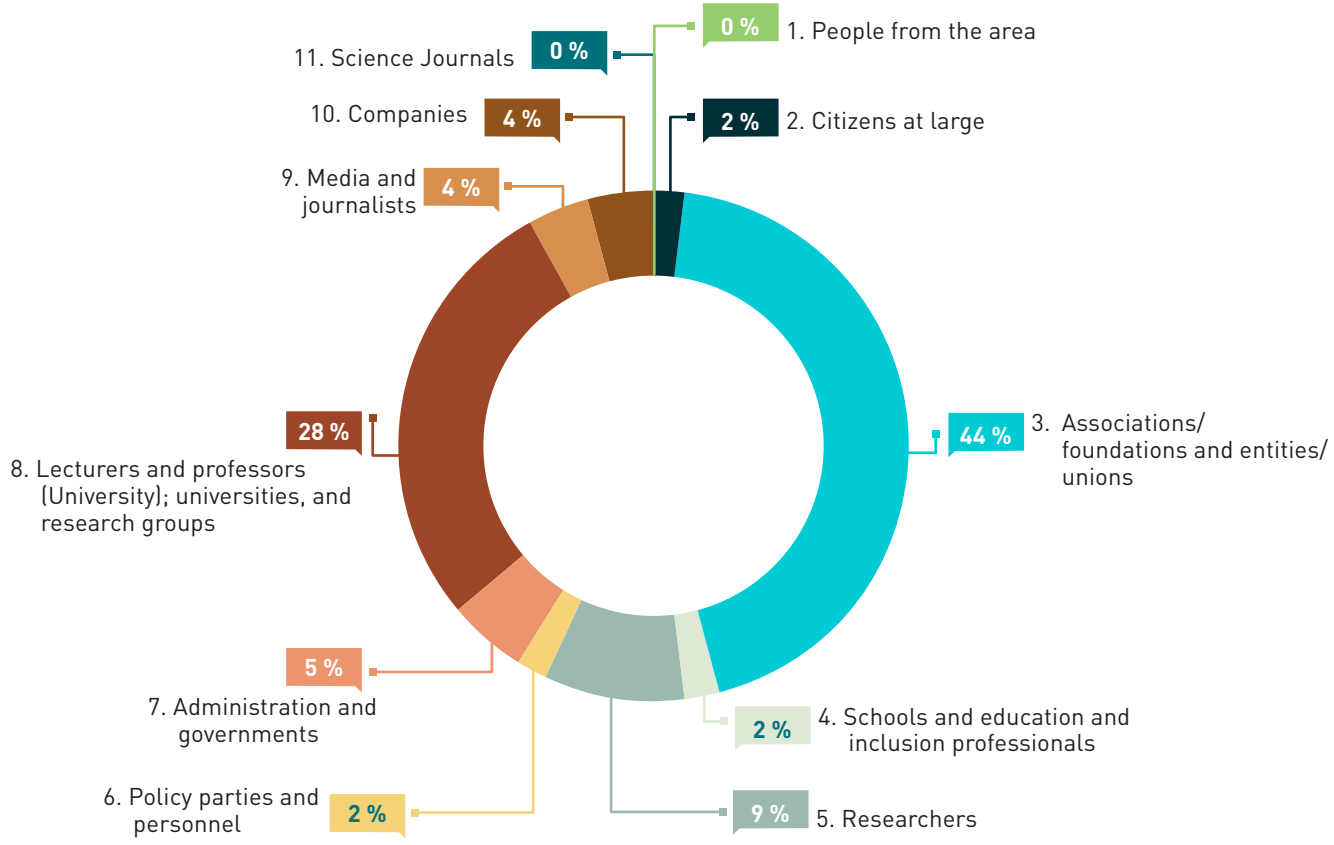
RESULTS

The results of the analysis are presented below.

1. Results: Who disseminates scientific knowledge in relation to the area of gender and socio-cultural situation on social media?

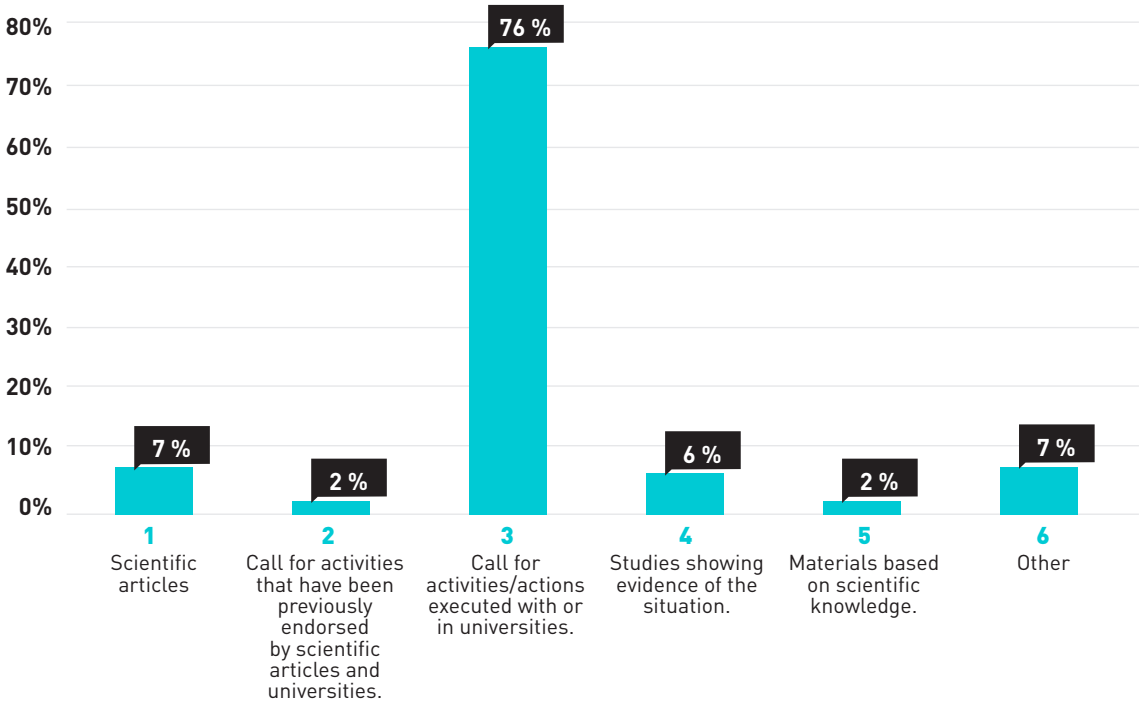
Of the 54 messages categorised as the dissemination of evidence-based information, the profile of the persons or entities is as follows: 44% of the profiles sharing evidence-based information on gender were associations, foundations and trade unions, followed by 28% referring to teachers, universities or research groups; 9% was content published by research staff, and, to a lesser extent, 5% was by administrations. Finally, 4% of the profiles corresponded to newspapers, media or journalists and companies, and 2% to political parties or political staff and schools or education and inclusion professionals. No profiles for scientific journal material were detected in the analysis.

Chart 1. Type of profile that disseminates scientific knowledge



As shown in Chart 2 (below), of the 54 messages from each of the groups that have disseminated evidence-based information, the vast majority of these, 76%, correspond to information related to calls for activities or actions carried out with or in universities; 7% of the Tweets selected in the sample refer to scientific articles, or categorised as 'Other', followed by studies showing evidence of the situation, at 6%; 2% is the figure for those Tweets corresponding to calls for activities that have been previously endorsed by scientific articles and universities, as well as materials with a scientific knowledge base.

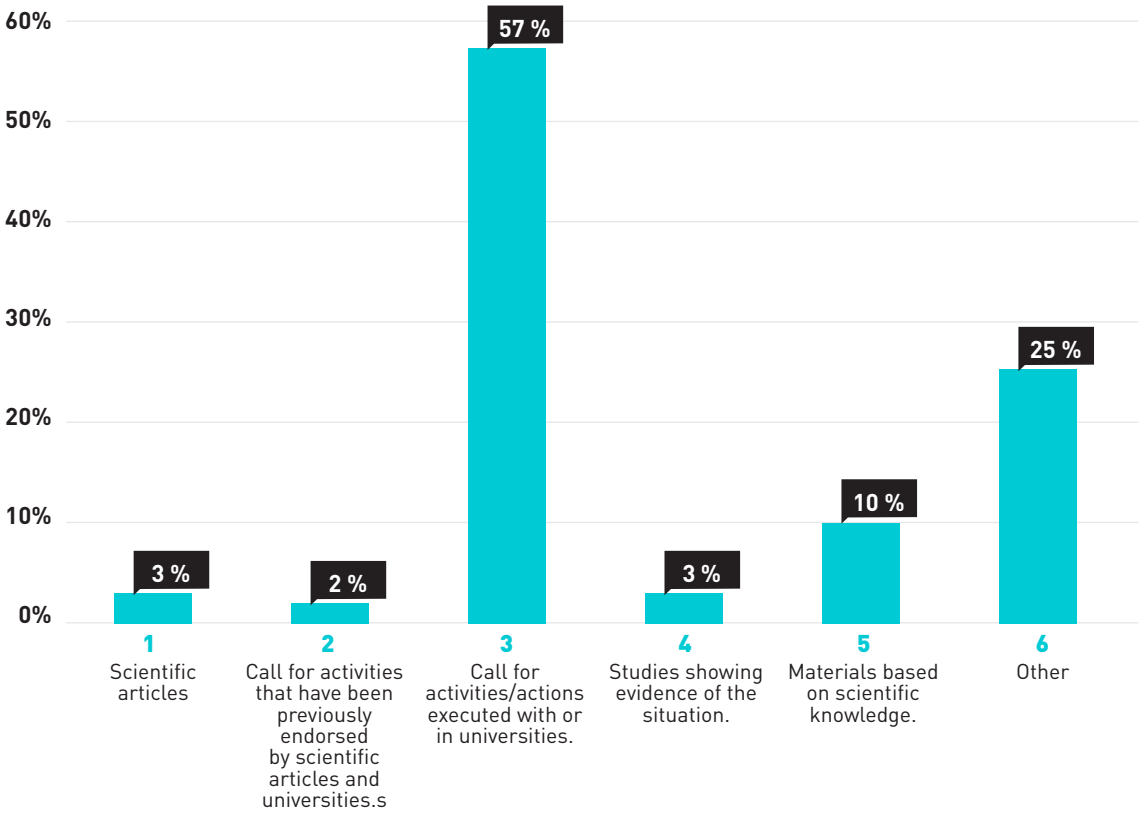
Chart 2. Type of content disseminated



2. Results: What evidence-based information is disseminated by groups or associations in relation to gender and sociocultural situation and who does so?

Of the 100 messages collected from each of the two entities/groups selected (total: 200), 119 messages have been identified as evidence. Of the sample of evidence identified, the most published type of content (57%) corresponds to calls for activities/actions carried out with or in universities. This is followed by 25% of the category 'Other', which includes, for instance, scientific dissemination activities not represented in the predefined categories. At 10%, scientific knowledge-based materials occupy third place. Scientific articles and case studies are on a par, at 3%; and finally, there is a 2% of calls for activities that have been previously supported by scientific articles.

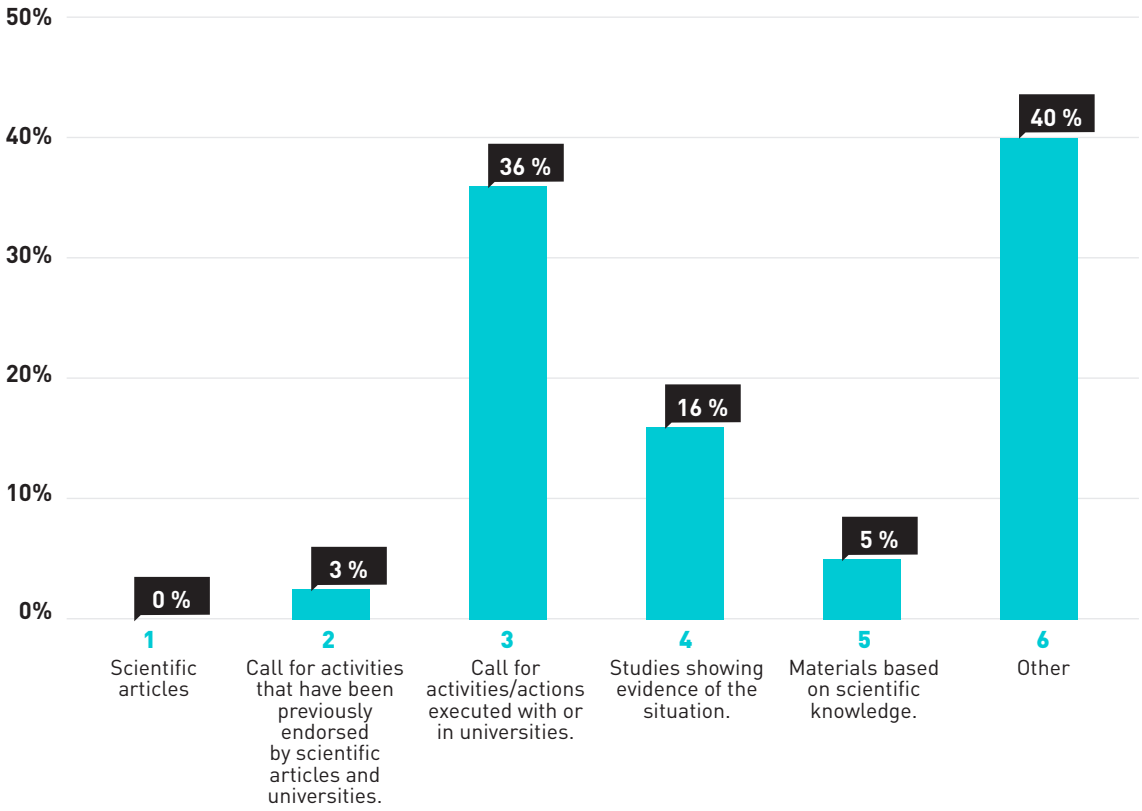
Chart 3. Type of content published by groups or associations



3. Results: What evidence-based information is disseminated by people in the area of gender and socio-cultural status and who does so?

In relation to the messages published by the two profiles of the people analysed, 77 messages that disseminate evidence have been identified. Of this content, 36% refers to activities and actions carried out with or in universities, while 16% represents content based on studies that demonstrate evidence of the situation. This is followed by 5% under the category of materials based on scientific evidence and 3% of scientifically endorsed activities or actions. It is worth noting that the 'Other' category is the one with the highest percentage, at 40%, and there are examples of dissemination of scientific content other than the predefined categories, such as videos for disseminating scientific evidence and activities outside the university but including evidence. .

Chart 4. Type of content published by people in the field



2. Area: cultural groups at risk of social exclusion. sub-field: the roma people[4]

SAMPLE

1. **Who disseminates scientific knowledge in relation to the Roma people on social media?** In order to determine this information, 500 messages published between 19/09/2020 and 19/10/2021 were extracted from the Twitter social network API, containing the hashtags: #pueblogitano #poblegitano, #educación, #educació, #inclusión, #PlaintegralPobleGitano, #aprenentatge, #evidencia, #ciencia, #investigación #recerca, #universidad #Universitat, #impacto #impacte, #gitanos , #gitanas, #gitanes.

2. **Who and what evidence-based information is disseminated by Roma groups or associations?** To extract this information, we looked at which organisations published the most evidence-based information. We then collected the last 100 Tweets and Retweets (a total of 500 messages) from the following organisations: @Dromkotar, @gitanos_org and @fakaligitana.

3. **Who and what evidence-based information is being disseminated by Roma people?** To extract this information, we observed which Roma people published the most evidence-based information. The last 100 Tweets and Retweets of these people were then collected.

4. The sub-field of Roma people has been chosen as representative of the wider field of cultural groups and groups at risk of social exclusion, as this is considered, according to existing data, to be the group that is most discriminated against in Europe. See: European Union (2019). Special Eurobarometer 493. Discrimination in the European Union. Available online: https://europa.eu/eurobarometer/surveys/detail/2251

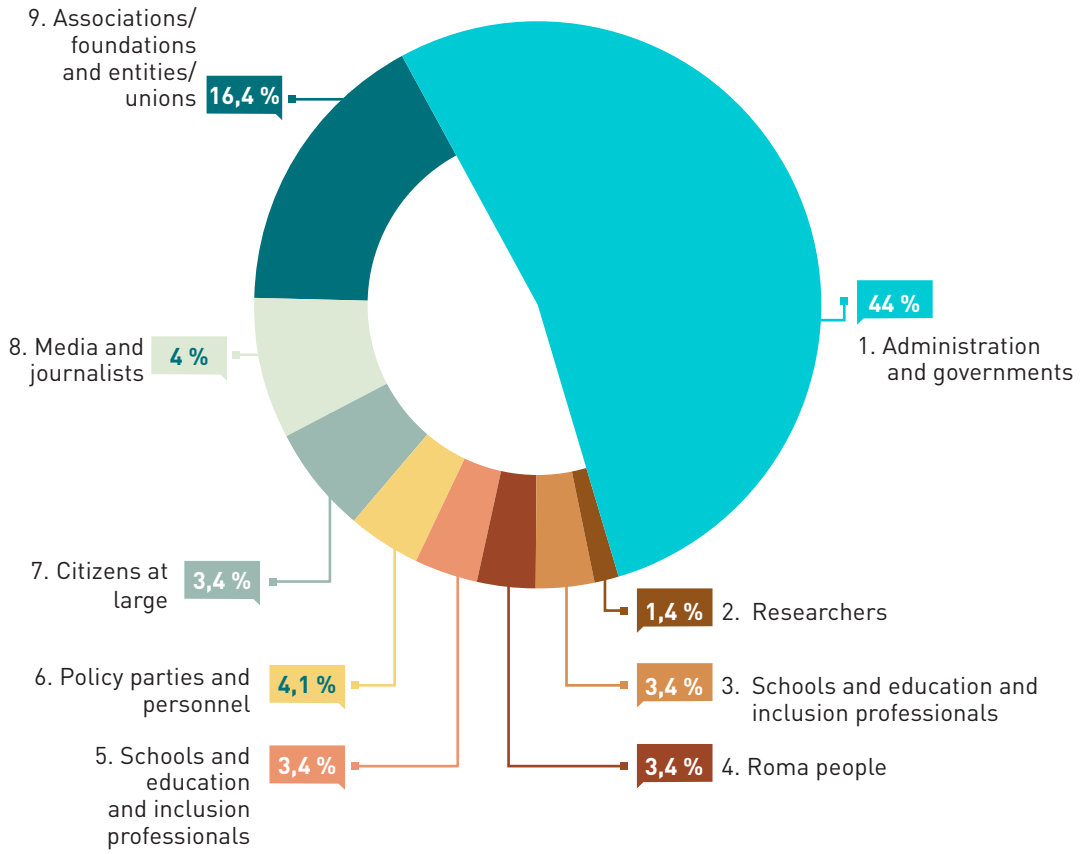
RESULTS

The results of this first analysis are presented below:

1. Who disseminates scientific knowledge in relation to the Roma people on social media?

Of the 500 messages collected, the persons or entities that have disseminated evidence-based information have been:

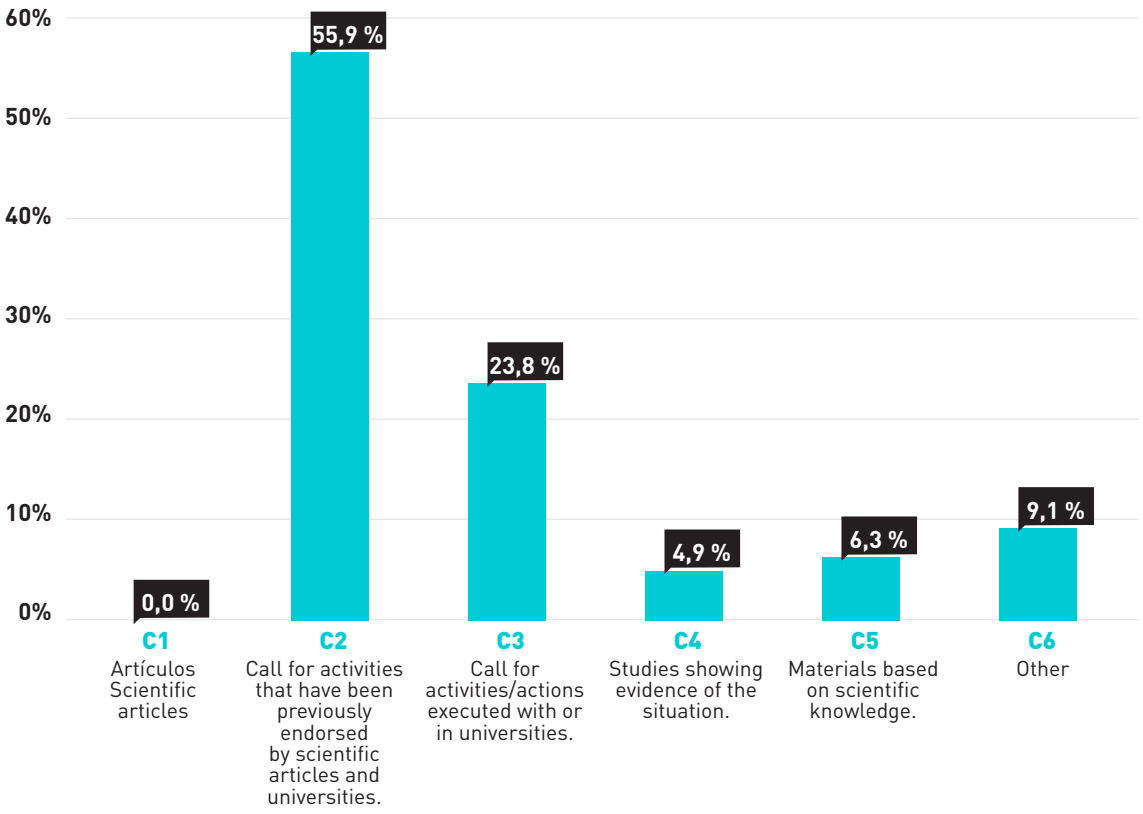
Chart 5. Type of profile that disseminates scientific knowledge



The Twitter messages analysed have disseminated content in relation to: 55.9% with calls for inclusion activities/actions that have been previously endorsed by scientific articles and universities; 23.8% with calls for inclusion/education activities/actions that were carried out with or at universities; 9.1% are studies showing evidence; 6.3% are scientific knowledge-based materials; and 4.9% are studies.

2. Results: What evidence-based information is disseminated by Roma groups or associations and who does so?

Chart 6. Type of content disseminated

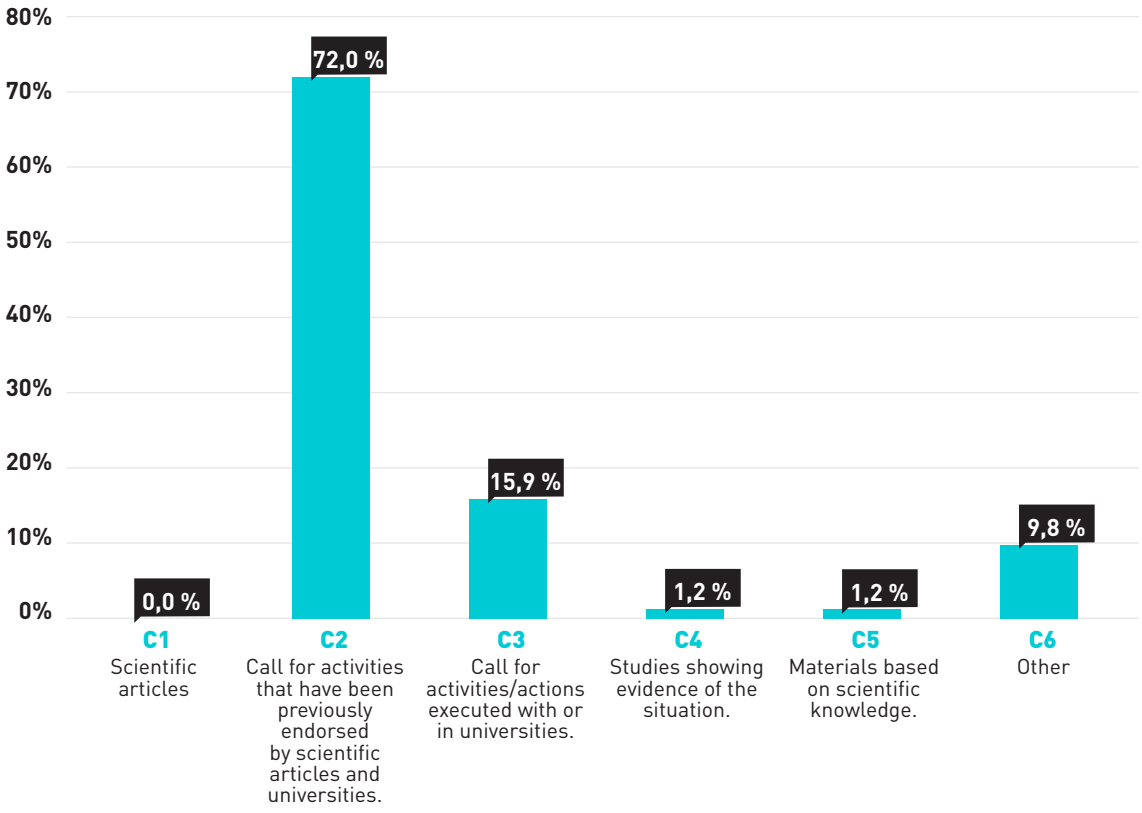


The organisations and entities which, once analysed, disseminate the most evidence-based information were:

NOMBRE	PERFIL	DESCRIPCIÓN
F .Secretariado Gitano	@gitanos_org	A non-profit social organisation that provides services for the development of the Roma community in Spain and Europe.
Fakali	@fakaligitanas	A federation of University Roma Women's Associations.
Asociación Drom Kotar Mestipen	@Dromkotar	A Roma women's association that works for the equality and non-discrimination of Roma women, promoting their participation in educational, social and cultural spaces.

Of the 100 messages collected from each of the entities/groups that have disseminated evidence-based information, 82 messages were related to: 72% with calls for inclusion activities/actions that have been previously endorsed by scientific articles and universities; 9.8% with calls for inclusion/education activities/actions that were carried out with or in universities; 15.9% are studies showing evidence; 1.2% are scientific articles; and 1.2% were related to 'Other'.

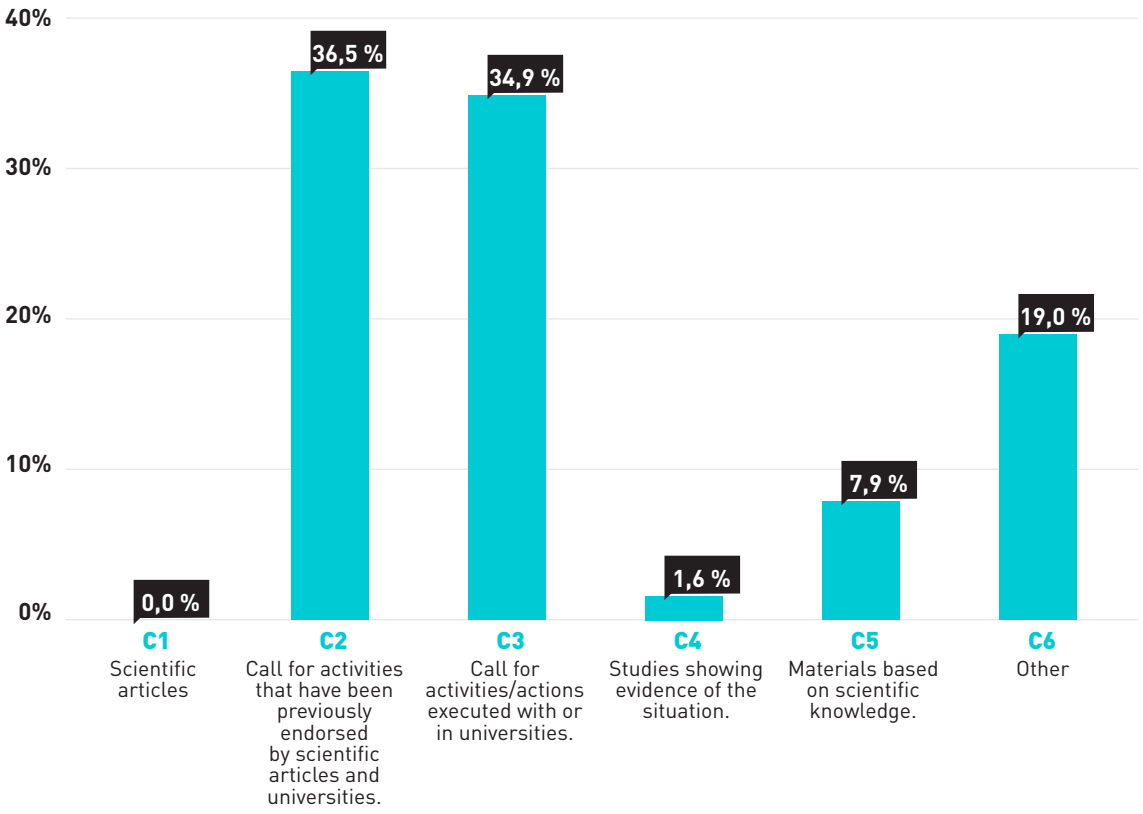
Chart 7. Type of content published by groups or associations



3. Results: What evidence-based information is disseminated by Roma people and who does so?

The five profiles of people analysed show 61 messages disseminating evidence. The content relates to: 34.9% with calls for inclusion activities/actions that have been previously endorsed by scientific articles and universities; 7.9% with calls for inclusion/education activities/actions that were carried out with or in universities; 19% are studies showing evidence; 1.6% are materials; and 36.5% were related to 'Other'.

Gráfico 8. Type of content published by people in the field



3. Area: disability

SAMPLE

1. **Who disseminates scientific knowledge in relation to the field of disability on social media?** For the analysis of the selection of the sample in the disability field, the extraction of the messages published within the period between 28/09/2021 and 28/10/2021 has been configured. This was done by selecting different hashtags related to the field of disability and science and establishing a maximum capture of 500 Tweets for each search. The hashtags combined are: #disability #evidence, #intellectualdisability, #science, #inclusion, #impact, #inclusivescience, #research, #ScienceCommunication, #Diversity.

   The selection of the sample analysed from the total number of messages captured that were finally categorised as evidence resulted in a total of 247 messages.

   From the initial sample of 247 messages categorised as evidence, those posted by profiles of users from outside Spain were eliminated. Once only the profiles of users from Spain have been filtered out, and a total of 215 messages remain. Thus, the final sample for the disability area is 215 messages.

2. **What evidence-based information is disseminated by disability groups or associations and who does so?** To extract this information, we observed which organisations published the most evidence-based information and then collected the last 100 Tweets and Retweets from two organisations (a total of 200 messages).

3. **What evidence-based information is disseminated by people in the disability field and who does so?** To extract this information, we observed which people in the disability field (self-identified as such on their Twitter profiles) published the most evidence-based information. The last 100 Tweets and Retweets of the selected person were then collected.

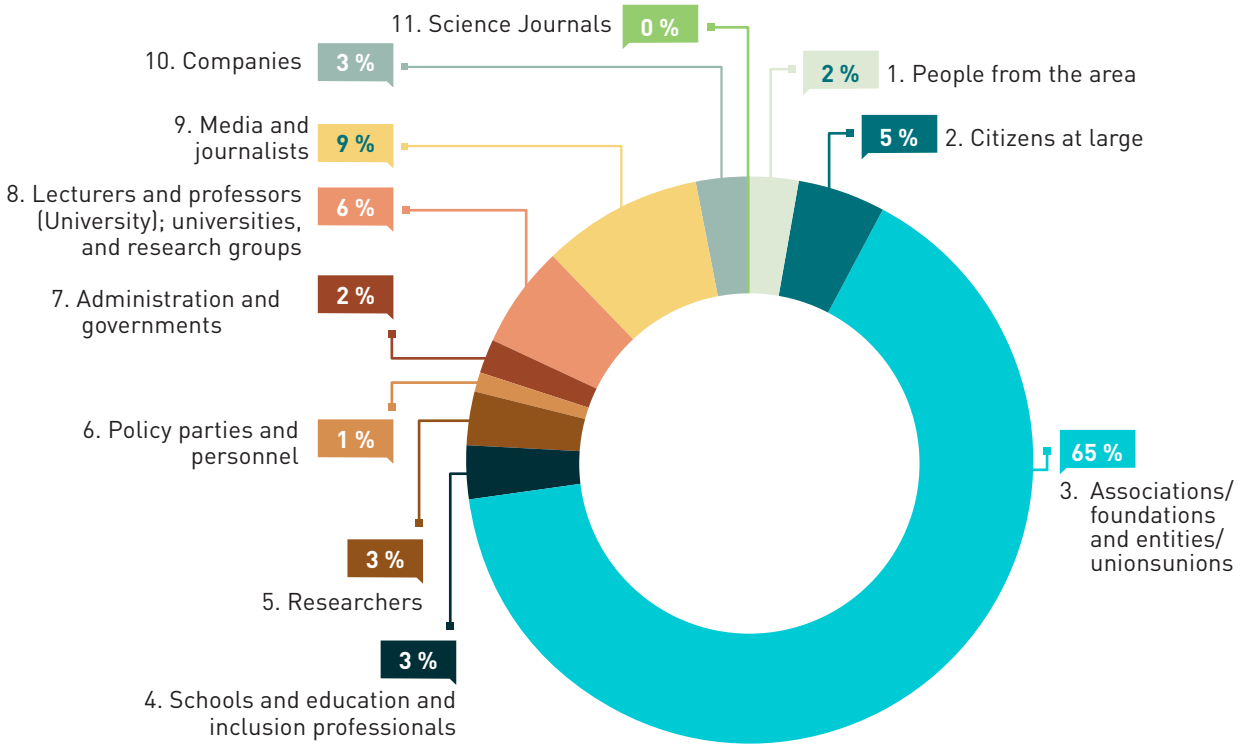
RESULTS

The results of the analysis are presented below.

1. Results: Who disseminates scientific knowledge in relation to the field of disability?

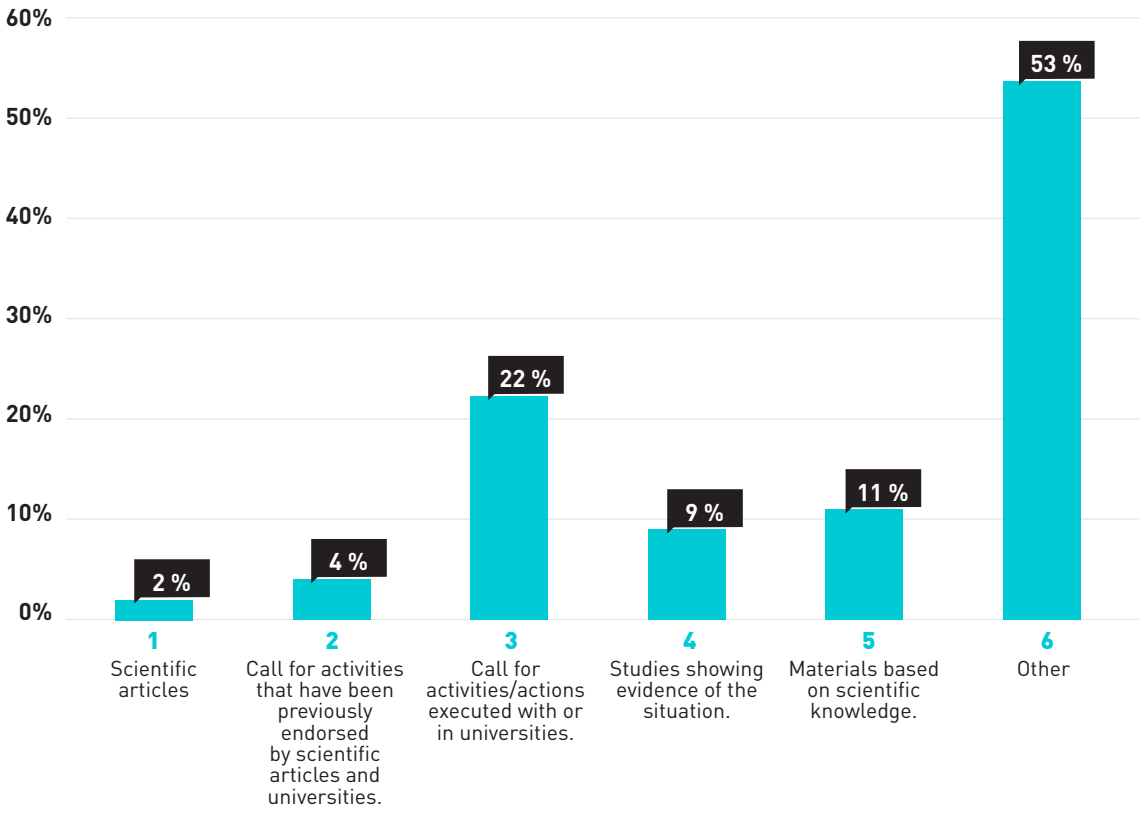
Of the 215 messages categorised as evidence, the profile of the people or entities identified that most disseminate scientific knowledge messages in relation to the field of disability and science are associations and/or foundations, accounting for 65% of the total. The rest of the content for the field analysed has been published by the general public, 5%; and with a similar percentage, of between 1% and 3%, by the rest of the profiles included, i.e. people from the field itself, schools or professionals in education or inclusion and administrations, among others.

Chart 9. Type of profile disseminating scientific knowledge



Type of content published (below) shows the list of types of content tweeted and classified as evidence. Firstly, it should be noted that the vast majority of Tweets published have been classified as 'Other', i.e. lying outside the standard classification. This category includes, for example, content about disability-related events in the field of science, albeit taking place outside the academic university environment. Next, 22% were announcements of activities/actions carried out with or in universities, and 11% was evidence of shared materials with a scientific knowledge base. Of the total evidence obtained for the disability area, 9% was content related to studies showing evidence of the situation.

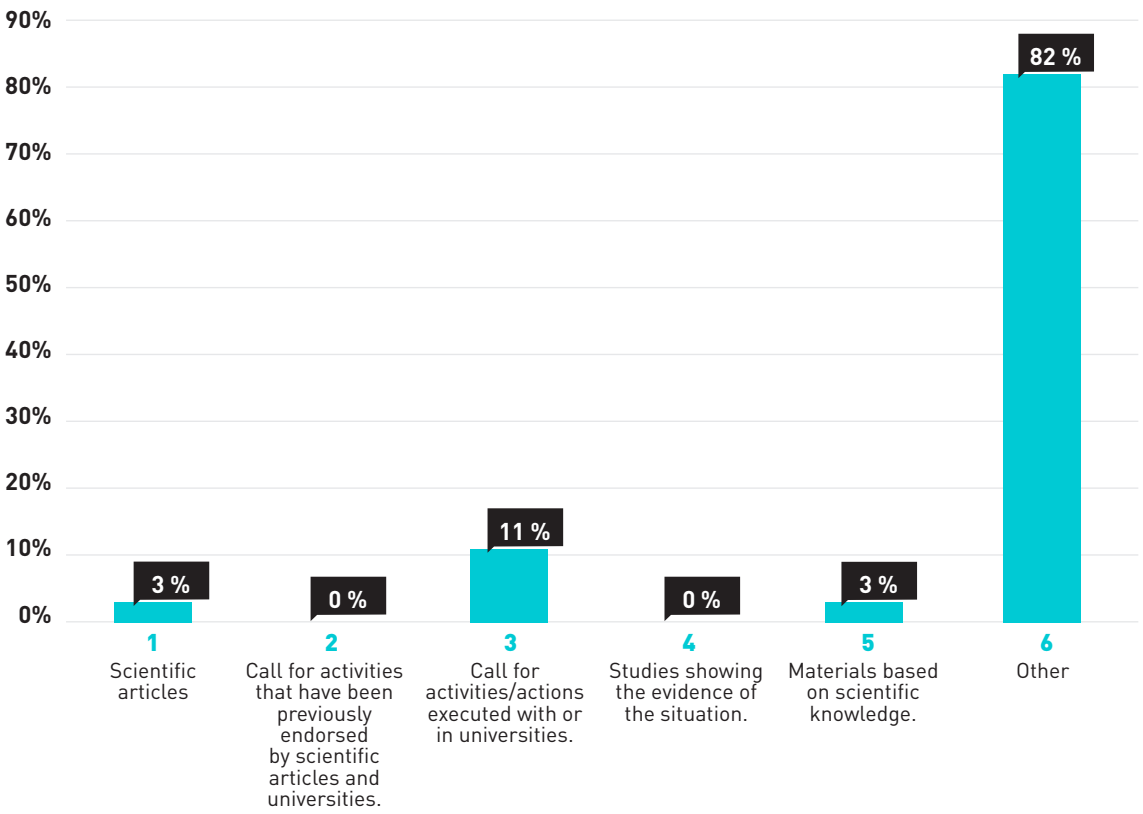
Chart 10. Type of content published



2. Results: What evidence-based information is disseminated by disability groups/associations and who does so?

Of the 100 messages collected from each of the selected entities/groups that have disseminated evidence-based information, 61 messages have been identified as evidence. The highest percentage lies in the category of 'Other', 82%, which includes activities or initiatives for the dissemination of scientific evidence not included in the predefined categories, for example a YouTube channel dedicated to the dissemination of scientific evidence. Content corresponding to calls for activities and actions carried out with or in universities is at 11%. And finally, at 3%, two categories were identified: scientific articles and scientific knowledge-based materials.

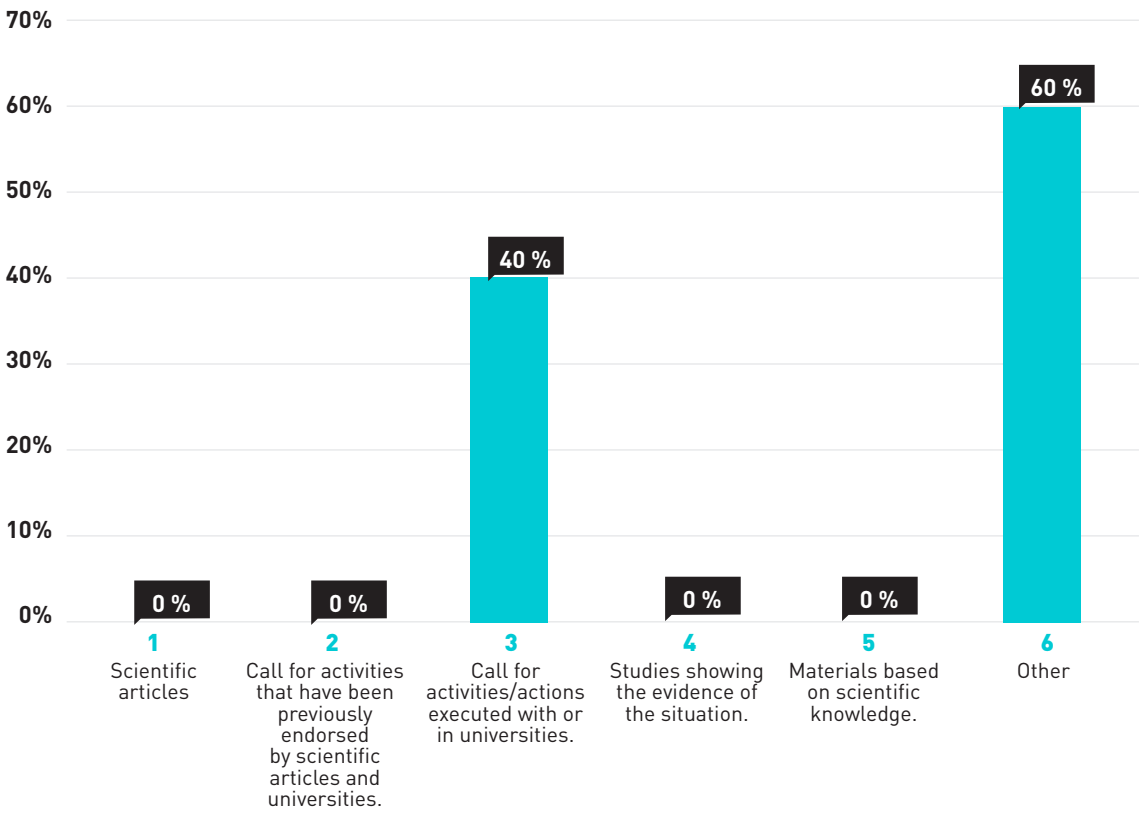
Chart 11. Type of content published by groups or associations in the field



3. Results: What evidence-based information is being disseminated by people in the disability field and who does so?

In this case, of the data set analysed, one personal profile has been that which has published the most, and which self-identifies in its profile as a person with a disability. The last 100 messages published on this profile have been analysed, and five shared forms of evidence have been identified; 40% corresponds to content based on calls for activities or actions carried out with or at university, and 60% to content published under the category of 'Other', especially activities carried out outside the university but including the dissemination of scientific evidence.

Chart 12. Type of content published by people in the field



4. Area: LGBTI+ People

SAMPLE

1. **Who disseminates scientific knowledge in relation to LGBTI+ people on social media?** In order to analyse the selection of the sample of LGBTI+ people, the extraction of the messages published within the period from 28/09/2021 to 28/10/2021 was configured with a maximum of 500 Tweets for each search and then unified in a single list. The hashtags combined are: #LGTBIQ, #science, #queer, #evidence, #diversity, #science, #inclusivescience, #impact, #QueerScience, #lgtb. The selection of the sample to analyse from the total number of messages captured corresponds to those categorised as evidence. In this case, the final sample was 41 Tweets.

   From the initial sample of 41 messages categorised as evidence, those posted by profiles of users outside Spain were eliminated. Once only the profiles of users from Spain were filtered out, and a total of 23 messages remained. Thus, the final sample for LGBTI+ people is 23 messages.

2. **What evidence-based information is disseminated by LGBTI+ groups or associations and who does so?** To extract this information, we observed which organisations published the most evidence-based information. We then collected the last 100 Tweets (a total of 200 messages) and Retweets from two organisations.

3. **What evidence-based information is disseminated by LGBTI+ people and who does so?** To extract this information, we observed which LGBTI+ individuals (self-identified as such on their Twitter profiles) published the most evidence-based information. The last 100 Tweets and Retweets of these people were then collected.

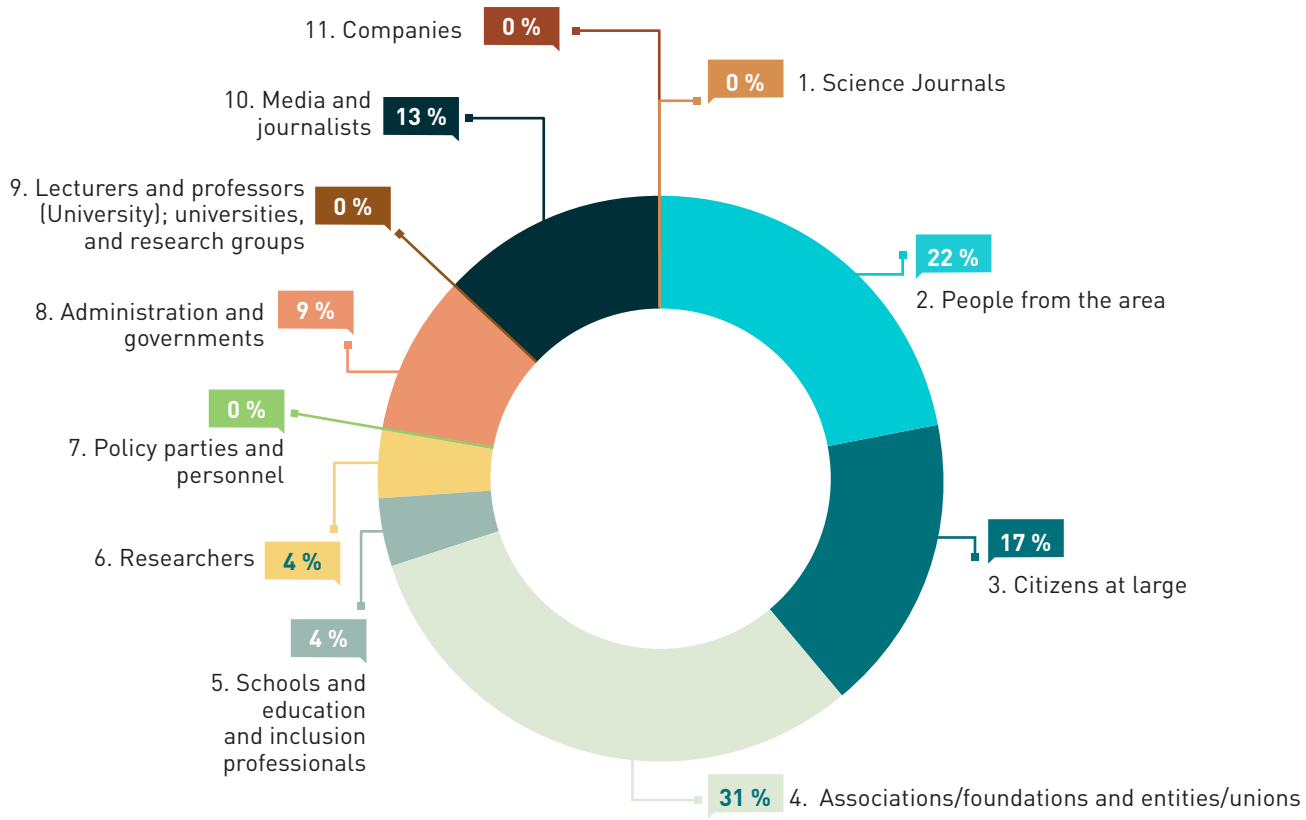
RESULTS

The results of the analysis are presented below.

1. Results: Who disseminates scientific knowledge in relation to LGBTI+ people on social media?

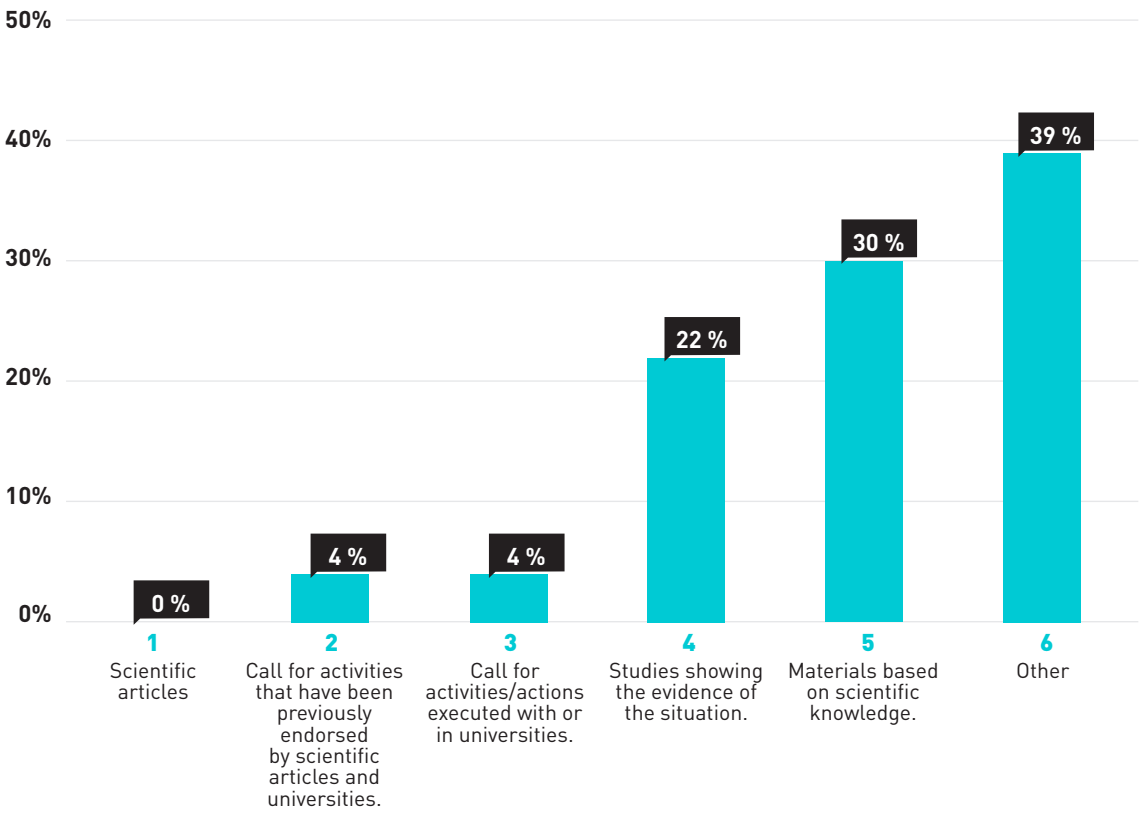
Of the 23 messages categorised as evidence-based information, the most active profiles were, first of all, associations, at 31%. Of the total number of Tweets collected in the sample, 22% were posted by LGBTI+ members. Next, 17% correspond to material shared by the public and 13% by the media. To a lesser extent, 9% are administrations and 4% correspond to schools or education and inclusion professionals, as well as researchers.

Chart 13. Profiles of people or institutions disseminating scientific knowledge



In relation to the type of content disseminated, the percentage of materials with a scientific knowledge base represents 30% and studies showing evidence amount to 22%. The category of 'Other', which includes a diversity of actions other than those represented in the standard categories, amounts to a higher figure of 39%. Finally, 4% are calls for activities supported by scientific articles and universities and calls for activities or actions that were carried out with or in universities.

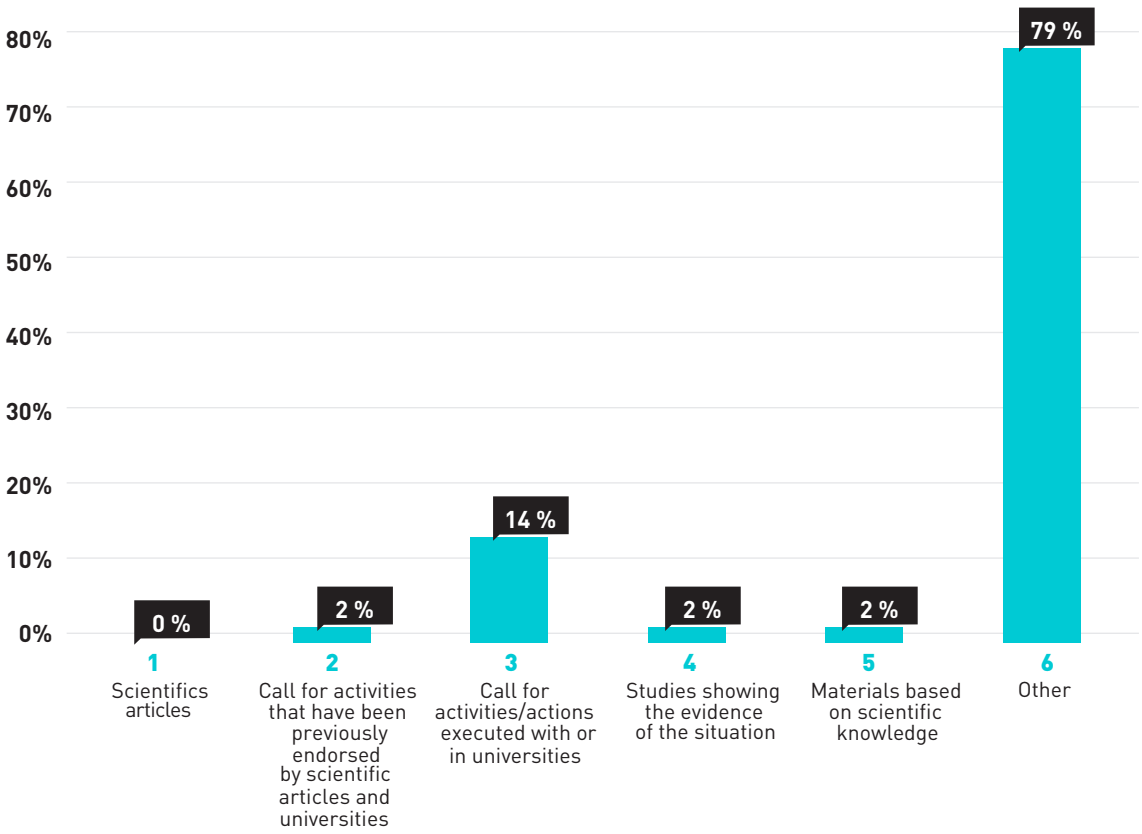
Chart 14. Type of content disseminated



2. Results: What evidence-based information is disseminated by LGBTI+ groups or associations and who does so?

Of the 100 messages collected from each of the selected entities/groups that have disseminated evidence-based information, 43 messages have been identified. Of the content analysed, 14% refers to calls for activities/actions that were carried out with or in universities; 2% to three category types (calls for scientifically endorsed activities, studies showing evidence and scientific knowledge-based materials); and the highest figure, 79%, to 'Other', meaning examples of scientific dissemination content, such as evidence from history in different formats not included in the predefined categories.

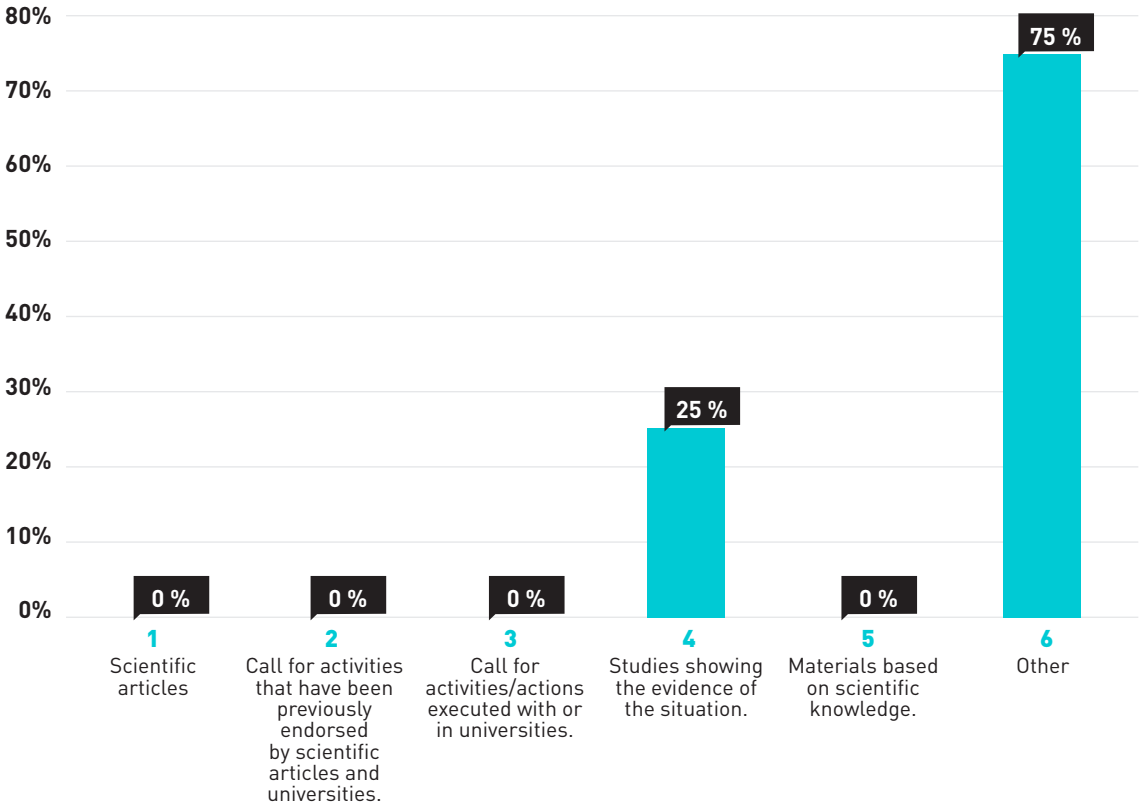
Chart 15. Type of content published by groups or associations



3. Results: What evidence-based information is disseminated by LGBTI+ people and who does so?

Of the total sample analysed of the content published by the two personal profiles of LGBTI+ people, eight pieces of evidence have been identified. Of these eight pieces of evidence, 25% corresponds to studies that demonstrate evidence of the situation and 75% to the 'Other' category, with examples of science dissemination that differ from the predefined categories.

Chart 16. Type of content published by LGBTI+ people



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REFLECTIONS AND SUCCESSFUL ACTIONS

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