Vol. 1 | 20
Nº 2 | 21 SciComm REPORT

UNIVERSIDAD AUTÓNOMA DE CHILE
MÁS UNIVERSIDAD

Comment

ISSN 2735-623X

Received: 2021/06/08 • Accepted: 2021/06/17

Twelve reasons –not new but often forgotten– for scientists to participate in science communication activities

Doce razones –no nuevas pero a menudo olvidadas– para que los científicos participen en actividades de comunicación de las ciencias

Ronnie Reyes-Arriagada
Dirección de Vinculación con el Medio, Universidad Austral de Chile, Valdivia, Chile.

Carla Christie
Doctorado en Comunicación Universidad de la Frontera - Universidad Austral de Chile. Valdivia, Chile.

Paul Bamford
North of England Zoological Society (Chester Zoo). Cheshire, UK.

Corresponding author: Ronnie Reyes-Arriagada
Dirección de Vinculación con el Medio, Universidad Austral de Chile, Valdivia, Chile.
Mail: ronnie.reyes@uach.cl

ABSTRACT

Scientific communication through outreach and engagement activities is currently recognized as an important element of researcher's work, however, participation by scientists in this type of activities remains low. Many scientists do not understand the purpose and benefits that outreach provides for the public at large, which may further account for a low percentage of time devoted to scientific communication. The growing societal role of science communication becomes paradoxical in light of the limited motivation by scientists to participate in these activities. Therefore, the objective of this article is to provide a brief, limited and systematic summary of 12 arguments that justify why scientists should be communicating their work to society. These arguments may be useful for scientific and technological institutions in developed countries, and especially in developing countries, where the social bond to science and technology is more limited.

Keywords: Outreach, Barriers, Science Communication, Public Understanding of Science, Reasons.

Doi: 10.32457/scr.v1i2.1604

RESUMEN

La comunicación científica a través de actividades de divulgación y participación pública, se reconoce actualmente como un elemento importante del trabajo de las y los investigadores, sin embargo, su participación en este tipo de actividades sigue siendo baja. Muchos de los y las científicas no comprenden el propósito y los beneficios que la divulgación brinda al público en general, lo que se puede reflejar en un bajo porcentaje de tiempo dedicado a la comunicación científica. El creciente papel social de la comunicación de las ciencias se torna paradójico a la luz de la limitada motivación de las y los científicos por participar en estas actividades. Por ello, el propósito de este trabajo es ofrecer un resumen breve, limitado y sistemático de 12 argumentos que justifican por qué las y los científicos deberían estar comunicando su trabajo a la sociedad. Estos argumentos pueden ser útiles para instituciones científicas y tecnológicas en países desarrollados, y especialmente en aquellos países en vías de desarrollo, donde el vínculo social con el sector científico y tecnológico es mucho más limitado.

Palabras clave: Difusión, barreras, comunicación científica, comprensión pública de la ciencia, razones.

Comment

Scientific communication through outreach and engagement activities is currently recognized as an important element of the work of a scientist and even more in current times of health crisis. University regulations worldwide include outreach amongst the main responsibilities of an academic, but in practice, science communication is the activity that occupies the least priority, if any at all (Bauer and Jensen 2011) in order to focus on other responsibilities. Public engagement and participation by academics, scientists and graduate students remains low and often perceived with a number of barriers to be involved in these initiatives. Reasons include: (1) time and resource limitations; (2) perceived exemption of the responsibility to participate, based on the belief that other professionals should fulfill this role; (3) lack of awareness of relevant public or private initiatives and funding sources; (4) remunerated services (e.g., private contracts and consultancies) misinterpreted as scientific outreach; (5) a perceived bias in popularity of the life and physical sciences, which limits motivation to participate by scientists working within other fields; (6) lack of intrinsic motivation amongst scientists to participate in this type of activities; (7) lack of economic or academic incentives; and (8) lack of relevant training (Burcher 2015), and (9) fear to be exposed in the media with a scientific misunderstand.

In addition, many scientists do not understand the purpose and benefits that outreach provides for the public at large and for the scientist itself, which may further account for a low percentage of time devoted to scientific communication, when compared to academic and research activities. Addressing this issue is fundamental in generating motivation amongst scientists to engage with non-academic audience. The growing societal role of science communication becomes paradoxical in light of the low motivation by scientists to participate in these activities. Therefore, the objective of this report is to provide a brief, limited and systematic summary of 12 arguments that justify why scientists should be communicating their work to society, and the benefits or positive implications for both sides to do so.

Benefits that science communication conveys on scientists

1. It fosters an appropriate concept of science communication within the scientific community. Due to inexperience or lack of involvement in science communication activities, some researchers interpret the promotion and sale of services, or the undertaking of consultancy work, as activities linked to connectedness and knowledge transfer to civil society. In these cases, opportunities should be found to create incentives for greater participation by scientists who do not regularly engage with the public, creating opportunities for them to develop their skills and obtain the necessary tools to use them (Webb et al. 2012).

2. It improves graduate students' expertise within their specialist fields, and of their experimental design skills. Graduate students rarely spend time interacting, teaching, or disseminating the results of their research with students or the non-academic community. However, it has been demonstrated that performing these activities improves their communication capacity, the ability to improve research design skills, manage unusual situations and questions, and enhances their confidence within their specialist area (Harrison et al. 2011). These benefits also occur when carrying out outreach activities in a school group context. The presence of young researchers in classrooms it also contributes to a dialogue which may demystify the stereotypical figure of the scientist: only male, older, more serious, and less approachable individual (Tintori and Palomba 2017).

3. It enhances the visibility of science and technology in the media. Evidence suggests that many scientists consider the visibility of science in the media to be important and in general react positively to media coverage of their research work. However, instead of framing interactions between scientists and the media we should move to define these as one of the intrinsic roles of modern scientists, aiming to develop their leadership skills (Peters 2013). In order to be regarded as opinion leaders or spokespersons on specific topics. This helps to sensitize society to the idea that science is performed by citizens who are capable of influencing or producing significant positive changes in our society, which in turn provides incentives amongst the media to include scientific topics in their platforms, just as they do with top sports figures, movie stars or successful politicians. Increased media attention may lead to a greater public appreciation of the work that scientists carry out, which in turn, is likely to favorably influence public spending in science and technology.

4. It creates opportunities for dialogue with non-specialists, which may lead to novel perspectives and ideas. Children and preschool-aged kids are more open to develop ideas in an abstract, imaginative and non-linear fashion. School teachers are proven to be more capable of creating multidisciplinary connections when developing arguments than academic staff working in higher education (McNeill and Knight 2013). The high level of specialization of many scientists in one specific area may leave them relatively impoverished in others and it has been observed how, when "old meets young" in activities such as talks, workshops and lectures, researchers are often perplexed by the complexity and diversity of the questions asked by their audience, which frequently relate to phenomena

not previously considered by the researcher. As a result, the debate between researcher and audience may be enriched with multiple foci that may be very different than those encountered within the academic setting (Besley et al. 2015).

5. Telling our stories is valuable. All research has a story - the inspiration, developing experiments, hard work, failures and successes that make up the scientific process - and sharing it with others makes the research meaningful and worthwhile. Most scientists enjoy science communication activities and sharing their passion for their research (Bowater and Yeoman 2013). It feeds the human need for storytelling, connecting with our communities, sharing part of our personal identity and motivations, and ideally, inspiring others to feel interested in our research, results and projections. While communicating with others, scientists rediscover their passion for their research and even develop a clearer understanding (Bowater and Yeoman 2013). To help the public understand and engage with scientific content, it needs to be communicated with emotion. Teaching and learning are emotional cognitive acts, there is no reasoning without emotion (Chocobar 2020) - therefore, it makes sense that the more emotion the communicator delivers, the more engaged the audience will be.

Benefits that science communication conveys on society

6. It fosters the development of cognitive skills, reasoning capacity and the use of methodological tools amongst children and adolescents. Direct contact between scientific world with children and adolescents generates exposure to contact with, and appropriation of the way scientists see the world. This may have a positive influence for school student's capacity to observe of the world from all possible perspectives, fostering to formulate rational questions, and to apply the scientific method as an applied tool. This becomes more relevant in countries where the dominant education culture is based on rote learning and passive acquisition of knowledge (Richmond 2007).

7. It reinforces classroom-based science learning. The presence of a scientist in classrooms can enrich the work of teachers, who value the opportunity to learn about recent advances within their subject-specialist areas, also offering novel learning opportunities for their pupils. Teachers as message multipliers, enhances the educational value of the outreach activity, disseminating and reinforcing what they have learned amongst all of the learners that pass through their classroom (Friedman 2008). Ideally, science outreach programs for teachers should incorporate a social and constructivist learning approach that will equip teachers with the skills to enable their learners to solve problems and learn actively (Krasny 2005).

8. It protects civil society from confusing or misinterpreting scientifically-proven facts with unfounded or subjective points of view. The credibility of research-based science may be undermined in the public eye by perspectives that are rooted in subjective opinions, beliefs, or ideologies, and lacking in a solid evidence-based foundation (Boudry et al. 2015). The scientific perspective, based on methodological rigor, and lacking in values-based judgements provides a credible viewpoint from which to survey the universe in all its complexity. Additionally, by encouraging and enabling us to ques-

tion the dogmatic and superstitious beliefs that are at the root of many social conflicts, science provides a direct benefit to the wellbeing of people and society. Even scientific journals are publishing explicit calls against leaders who ignore evidence in response to worldwide crisis, as in case of COVID-19 (Basset 2020).

9. It enhances public engagement with science and technology. Even though society understands the development of science, technology, and innovation as one of the motors of human development, people show little interest or involvement in issues relating to science and technology, due to the perception that it is foreign, boring and mostly incomprehensible (Leshner 2007). Thus, the generators of knowledge must consider it a moral duty to transform the findings of S&T into accessible and attractive topics, using direct and clear language, whilst emphasizing the main findings and their implications for society. This would help to overcome the indifference or lack of interest for S&T that is often displayed by people outside of the academic world and enable the formation of a scientific culture in civil society.

10. It may influence increased public spending in science and technology. Public spending within any given country is prioritized according to the issues that the government considers to be most pertinent. In developing countries, average public spending on S&T is only 0.5 percent of GDP (2 percent by member states of the OECD). One of the reasons why S&T budgets drop to values below one percent, may be related to the fact that these topics do not form part these countries governments' priority investment agendas. Despite public spending on science contributes to the economy in several ways, the deprioritization of this sector may be due to a lack of awareness amongst civil society as to the relevance this sector plays in the social and economic wellbeing of their country. Important lessons have emerged from countries that have handled the pandemic in good and bad ways (Anessi-Passena et al. 2020, You 2020).

11. Scientific findings may assist in decision-making and State management-planning. Scientists should make information available that is both scientifically accurate, and understandable to decision-makers and the public (de Bruin and Bostrom 2013), thus equipping these stakeholders, in order for them to be able to participate actively in the discussion of socially relevant topics. However, formers often become frustrated when government decisions do not take scientific arguments and scientific papers into account to support policies and management plans (Singh et al. 2014). These may be ignored due to a limited capacity amongst public and authorities to distinguish scientific fact from less credible, conflicting sources of information (Boudry et al. 2015). Scientists frequently express concern about instances in which decisions, taken by authorities, are not based on the weight of scientific evidence where it exists, favoring political or power interests (Kreps and Kriner 2020). Von Winterfeldt (2013) proposed an action framework that would help closed the breach between both sides.

12. It improves the general public's ability to value and care of the natural environment. The need for greater inclusion of the human dimension within wildlife conservation has been raised by scientists in both developing and developed nations, creating a dialogue between local people and scientists. This allows scientists to benefit from local knowledge, to understand local perspectives and values, and to define the barriers and benefits that shape the capacity of

local people to become drivers for environmental protection. Local people may benefit from feeling included in the conservation process, may gain a greater understanding of the value of environmental protection to their communities, and may be aided in efforts to overcome the social or economic challenges that were at the root of threats to the local environment and biodiversity (Hesselink et al. 2007). Participatory approaches to conservation have a higher probability of achieving social acceptance, influencing results that have environmentally favorable impacts, and motivating greater political engagement amongst participants (Franzolin et al. 2020).

The twelve arguments presented above are a synthesis of literature review and our own experience as scientists and science communicators. Our hope is to motivate greater participation of scientists in engaging with the public in S&T communication activities. Today, it is clear with covid-19 pandemia, it is necessary to foster and spread scientific literacy within the society, to improve the participation of citizens in the decisions related to the application of new knowledge. We want to change the perception that science is boring, incomprehensible, and inaccessible but we need to improve the ways to communicate science, and to instill a greater critical capacity in our children and youth. Only by understanding the world in which we live, can we advance toward a fair society, free from prejudice, fear, and ignorance. Communicating this is also a fundamental part of our role as scientists.

References

Annessi-Passena Eugenio, Carmela Barbera, Cecilia Langella, Francesca Manes-Rossi, Alessandro Sancino, Mariafrancesca Sicilia, and Ileana Steccolini. 2020. "Reconsidering public budgeting after the COVID-19 outbreak: key lessons and future challenges." Journal of Public Budgeting, Accounting & Financial Management 32 (5): 957-65. https://doi.org/10.1108/JPBAFM-07-2020-0115.

Basset, Mary T. 2020. "Tired of science being ignored? Get political." Nature 586 (7829): 337. https://doi.org/10.1038/d41586-020-02854-9.

Bauer, Martin W., and Pablo Jensen. 2011. "The mobilization of scientists for public engagement." Public Understanding of Science 20 (1): 3-11. https://doi.org/10.1177/0963662510394457.

Besley, John C., Anthony Dudo, and Martin Storksdieck. 2015. "Scientists' views about communication training." Journal of Research in Science Teaching 52 (2): 199-220. https://doi.org/10.1002/tea.21186.

Boudry, Maarten, Fabio Paglieri, and Massimo Pigliucci. 2015. "The fake, the flimsy, and the fallacious: Demarcating arguments in real life." Argumentation 29 (4): 431-56. https://doi.org/10.1007/s10503-015-9359-1.

Bowater, Laura and Kay Yeoman. 2013. Science Communication: a practical guide for scientists. Jhon Wiley & Sons. https://www.wiley.com/legacy/wileychi/bowater/

Burcher, Kevin. 2015. Factors affecting public engagement by researchers: literature review. Policy Studies Institute, London. https://wellcome.org/sites/default/files/wtp060036.pdf.

de Bruin, Wändi Bruine, and Ann Bostrom. 2013. "Assessing what to address in science communication." Proceedings of the National Academy of Sciences 110 (S3): 14062-68. https://doi.org/10.1073/pnas.1212729110.

Chocobar, CN. 2020. Mora, F. Neuroeducación. Solo se puede aprender lo que se ama. Educatio Siglo XXI, 38(2): 263-268. https://revistas.um.es/educatio/article/view/434181.

Franzolin, Fernanda, Paulo S. García, and Nelio Bizzo. 2020. "Amazon conservation and students' interests for biodiversity: The need to boost science education in Brazil." Science Advances 6 (35): eabb0110. https://doi.org/10.1126/sciadv.abb0110.

Friedman, David P. 2008. "Public Outreach: A Scientific Imperative." The Journal of Neuroscience 28 (46): 11743-45. https://doi.org/10.1523/JNEUROSCI.0005-08.2008.

Harrison, T.G., K.L. Hanford, B.T. Cheesman, G. Kaur, S.D. Franklin, A.M.C. Laurain, M.I. Medley, A.C. Rivett, K.L. Shallcross, K.E. Shaw, S.J. Williams, and D.E. Shallcross. 2011. "The many positive impacts of participating in outreach activities on postgraduate students." New Directions 7: 13-17. https://doi.org/10.29311/ndtps.v0i7.461.

Hesselink, Fritz, Wendy Goldstein, Peter Paul van Kempen, Tommy Garnett, and Jinie Dela. 2007. Communication, education, and public awareness (CEPA): A toolkit for national focal points and NBSAP coordinators. Convention on Biological Diversity & IUCN Commission on Education and Communication. 308 pp. https://portals.iucn.org/library/node/9260.

Krasny, Marianne E. 2005. "University K–12 science outreach programs: How can we reach a broad audience?." BioScience 55 (4): 350-59. https://doi.org/10.1641/0006-3568(2005)055[0350:UKSOPH]2.0.CO;2.

Kreps, S.E, and D.L. Kriner. 2020. "Model uncertainty, political contestation, and public trust in science: Evidence from the COVID-19 pandemic". Science Advances 6 (43): eabd4563. https://doi.org/10.1126/sciadv.abd4563.

Leshner, Alan I. 2007. "Outreach training needed." Science 315 (5809): 161. https://doi.org/10.1126/science.1138712.

McNeill, Katherine L., and Amanda M. Knight. 2013. "Teachers' pedagogical content knowledge of scientific argumentation: The impact of professional development on K–12 teachers." Science Education 97 (6): 936-72. https://doi.org/10.1002/sce.21081.

Peters, Hans Peter. 2013. "Gap between science and media revisited: Scientists as public communicators." Proceedings of the natural Academy of Sciences 110 (S3): 14102-109. https://doi.org/10.1073/pnas.1212745110.

Richmond, Jonathan E. D. 2007. "Bringing critical thinking to the education of developing country professionals." International Education Journal 8 (1): 1-29. https://eric.ed.gov/?id=EJ841627.

Royal Society. 2006. Factors Affecting Science Communication: a Survey of Scientists and Engineers. 46 pp. The Royal Society, London. https://royalsociety.org/topics-policy/publications/2006/science-communication/.

Singh, Gerald G., Jordan Tam, Thomas D. Sisk, Sarah C. Klain, Megan M. Mach, Rebecca G. Martone, and Kai M.A. Chan. 2014. "A more social science: barriers and incentives for scientists engaging in policy." Frontiers in Ecology and the Environment 12: 161-66. https://doi.org/10.1890/130011.

Tintori, Antonio and Rosella Palomba. 2017. Turn on the light on science: A research-based

guide to break down popular stereotypes about science and scientists. Ubiquity Press. 120 pp. https://www.jstor.org/stable/j.ctv3t5r1s.

Von Winterfeldt, Detlof. 2013. "Bridging the gap between science and decision making." Proceedings of the National Academy of Sciences 110 (S3): 14055-61. https://doi.org/10.1073/pnas.1213532110.

Webb, Alexis B., Christopher R. Fetsch, Elisa Israel, Christine M. Roman, Cindy H. Encarnación, Jeffrey M. Zacks, Kurt A. Thoroughman, and Erik D. Herzog. 2012. "Training scientists in a science center improves science communication to the public." Advances in Physiology Education 36 (1): 72-76. https://doi.org/10.1152/advan.00088.2010.

You, Jongeun. 2020. "Lessons from South Korea's Covid-19 policy response". American Review of Public Administration 50 (6-7): 801-808. https://doi.org/10.1177/0275074020943708.