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Trajectories and training of science communicators in Chile

Trayectorias y formación de quienes ejercen la comunicación científica en Chile

Trajetórias e formação dos que exercem a comunicação científica no Chile

Teresa Vernal, Universidad Andrés Bello, Santiago, Chile
(teresa.vernal@unab.cl)

Macarena Peña y Lillo, Universidad Diego Portales, Santiago, Chile
(macarena.penaylillo@udp.cl)

Lorena B. Valderrama, Universidad de Santiago de Chile - USACH, Santiago, Chile
(lorena.valderrama@usach.cl)

ABSTRACT | The aim of this study was to develop a professional and specialized training profile of people who communicate science in Chile. To this end, 177 journalists and science communicators in the country were surveyed and the results compared with a previous study from 2017. The results show that science communication is carried out by science journalists and specialized communicators who work in a professional field that is mainly made up of scientific institutions, centralized, and predominantly occupied by women. Self-education is still an important factor in their careers, even if there is a strong interest in formal specialization. In terms of offerings, specialization programs have increased with the opening of new diploma programs.

KEYWORDS: Science communication; training in science communication; science journalism; specialization; dissemination, Chile.

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RESUMEN | *Este estudio buscó elaborar un perfil profesional y de formación especializada de las personas que comunican la ciencia en Chile. Se aplicó una encuesta a 177 periodistas y comunicadores de ciencia del país y los resultados fueron comparados con un estudio previo, realizado en 2017. Los resultados muestran que la comunicación de la ciencia es desarrollada por periodistas científicos y comunicadores con especialización que ejercen en un campo laboral compuesto, principalmente, por instituciones científicas, centralizado, e integrado mayoritariamente por mujeres. La autoformación continúa siendo un factor primordial en su trayectoria laboral, aun cuando existe un gran interés por continuar la especialización formal. Respecto de la oferta, los programas de especialización han aumentado con la apertura de nuevos diplomados.*

PALABRAS CLAVE: *Comunicación de la ciencia; formación en comunicación de la ciencia; periodismo científico; especialización; divulgación, Chile.*

RESUMO | Este estudo teve como propósito elaborar um perfil profissional e de formação especializada das pessoas que comunicam a ciência no Chile. Foi aplicada uma pesquisa a 177 jornalistas e comunicadores da ciência do país e os resultados foram comparados com um estudo prévio realizado no ano de 2017. Os resultados revelam que a comunicação científica é desenvolvida por jornalistas científicos e comunicadores especializados que trabalham em um campo profissional composto principalmente por instituições científicas, centralizado e majoritariamente integrado por mulheres. A autoformação continua sendo um fator primordial em sua trajetória profissional, mesmo quando existe um grande interesse por dar continuidade à capacitação formal. Quanto à oferta, os programas de formação continuada aumentaram com a abertura de novos cursos de especialização.

PALAVRAS-CHAVE: Comunicação científica; formação em comunicação científica; jornalismo científico; especialização; divulgação científica, Chile.

INTRODUCTION

Science communication, as understood through the dialogue model approach, is a collaborative effort involving scientists, public and private institutions, educators, and communicators to facilitate access to knowledge and foster a more informed society capable of participating in decision-making within diverse social and cultural contexts (Bauer, 2009; Reincke et al., 2020). In recent decades, this field has experienced significant growth and diversification (Trench, 2017), along with increasing interest in promoting its teaching in higher education (Baram-Tsabari & Lewenstein, 2017; Bankston & McDowell, 2018; Lewenstein & Baram-Tsabari, 2022). This development has also been notable in Chile; however, challenges remain regarding academic training, professionalization, and labor dynamics. Several studies have identified gaps between formal training and employment opportunities, as well as the coexistence of professional profiles originating from both communication and the basic sciences. These findings underscore the complexity of the field (Valderrama et al., 2014; Vernal et al., 2019).

Science communication plays a crucial role in disseminating scientific developments that the public can use to make informed decisions in areas such as health and ecology (Fischoff & Scheufele, 2013). However, a lack of specialization among practitioners may hinder its effectiveness. On many occasions, the messages delivered or published by scientists are of poor quality (Moreno-Castro & Gómez-Mompart, 2002). Despite growing interest and the central role of science communication in the scientific enterprise and society, inequalities persist in access to training and specialization (Llorente & Revuelta, 2023). Most science communication training programs are concentrated in Europe, with fewer opportunities available in Latin America and the Caribbean, and limited specialization options in Oceania and Africa (Massarani et al., 2023). Master's and doctoral programs are concentrated in Europe, where English predominates, which negatively impacts the opportunities for further training available to those from Latin American countries (Llorente & Revuelta, 2023).

In Chile, since 2012, studies have been conducted to characterize and quantify the academic background of those working in professional science communication. The limited initial specialization offerings in 2012 (Valderrama, 2014) were expanded in 2017 to include undergraduate programs and Chile's first diploma in science communication, delivered by the University of Chile in the capital, followed by a diploma program offered by the University of Antofagasta in the north of the country (Méndez & Pohl, 2018).

This article presents the results of the third national survey on science communication professionals in Chile (Ministry of Science, Technology, Knowledge,

and Innovation, 2023), updating previous studies from 2012 and 2017. It examines how recent phenomena, such as the COVID-19 pandemic, social upheaval, and the consolidation of social networks as sources of information, have influenced educational choices and professional trajectories in fields such as science, technology, health, and the environment. The evidence is expected to help strengthen the field in Chile by informing the design of inclusive and contextually relevant strategies.

Studies on science communication training in Ibero-America

Globally, studies on the effects of professional training in science communication or science journalism are scarce (Dunwoody, 2004; Becker et al., 2006; Beam et al., 2015; Smith et al., 2018; Smith & Morgoch, 2020). The same is true for Ibero-America, although research has progressed regarding the availability and focus of training programs. Elías (2002) initially studied the influence of popular science journalists in Spain and found that those with a bachelor's degree in science and a master's degree in journalism were not considered journalists by the media, due to their lack of training in information science. For information science graduates, specializing in science journalism was particularly demanding, mainly because of the requirement for fluency in English. According to Moreno-Castro and Gómez-Mompart (2022), the lack of specialization in science communication and inadequate training in schools of information and communication sciences in Spain have contributed to the production of low-quality messages.

In Latin America, studies on training in scientific communication began later than in Europe. In Chile, the profile of science communicators and the training of those engaged in science communication were first studied in 2012, revealing a low level of specialization (Valderrama, 2014). In 2017, the perceptions of journalists and science communication educators regarding the specialization they received were analyzed, showing that academic offerings in the field had not changed significantly during that period (Vernal et al., 2019). Moreover, a 2017 study on science communication practices in Chile concluded that outreach efforts were of low or, at best, moderate quality (Tabja Salgado et al., 2017). A study in Spain on the profile of science journalists working in traditional media found that, regardless of their university background, most neither hold higher education degrees in scientific fields nor consider such qualifications necessary. Instead, they place greater value on self-education and learning gained through professional practice within media organizations (Cassany et al., 2018). Specialization opportunities in science communication are scarce in undergraduate journalism and communication programs and at the postgraduate level. In 2016, a total of 22 graduate and continuing education programs aimed at training science communicators were registered in Latin America, primarily concentrated in Brazil (9), Mexico (7), Argentina (4), Colombia (2), and Chile (1) (Massarani et al., 2016).

Meanwhile, Meneses and Rivero (2017) analyzed the curricula and teaching guides of Spanish universities, revealing a limited availability of science communication programs. When journalism students were surveyed, they perceived science and technology communication as a challenging field to engage with, primarily due to the presence of content outside their area of training. Calvo-Rubio and Ufarte-Ruiz (2021) analyzed the curricula of 84 faculties offering journalism or communication studies across 15 Ibero-American countries, including Chile, and found that specialized or science journalism courses are offered in 52.4% of cases, although 63% of these courses are elective.

Following the COVID-19 pandemic, Acuña-Gamboa (2022) states that in Mexico, education researchers concentrate and disseminate their knowledge through specialized journals or within expert circles and lack opportunities for training in science communication, despite the crucial role of science journalism in engaging the public in research development in this field. According to Galvão and colleagues (2022), there is an institutional need to value, prioritize, and establish strategic dissemination agendas for effective science communication.

Extending their previous study, Massarani et al. (2023) mapped 122 science communication programs across 31 countries and found that over the last seven years, the number of programs in Latin America has increased, although they continue to be concentrated in the same countries: Brazil (13), Mexico (8), Argentina (5), Colombia (4), and Chile (2). The authors concluded that training should be aligned with students' needs and grounded in the contextual and cultural diversities of the countries in which they intend to practice.

This research seeks to continue an agenda focused on understanding the academic training of those engaged in science communication in the country. The objective is to characterize science communication practitioners in Chile by examining their sociodemographic profiles, areas of professional development, and training opportunities at different stages of their careers. We also inquired about the value they assign to different training opportunities and their interest in continuing to improve in this area.

Within this framework, the following research questions are posed:

> *Q1.* What is the professional profile of those who work in science communication and dissemination in Chile?
>
> *Q2.* What types of specialized training and self-directed learning strategies have you pursued, and how interested are you in further developing your skills in science communication?

METHODOLOGY

An online, self-administered survey was conducted with journalists and professionals involved in science communication in Chile, resulting in 177 responses. The inclusion criteria were holding a degree in journalism or communication from a Chilean institution and being professionally engaged in science and technology communication within the country. Individuals trained in other fields who work in communication or science dissemination were also included. This survey builds on a previous study conducted by members of the research team in earlier years (Vernal et al., 2019). Six expert peer reviewers reviewed and revised the instrument, and their comments were incorporated into the final version. The ethical protocol was approved by the Bioethics Committee of Universidad Andrés Bello of Chile.

To recruit participants, support for dissemination was requested from the Chilean Association of Science Journalists and Professionals for Science Communication (ACHIPEC), whose members received an email invitation with a link to the survey hosted on the Google Forms platform. This association represents a significant portion of the national sample among its members. Additionally, the survey, available between August and November 2023 (four months), was distributed through personal and institutional networks across several regions of the country.

Instrument description

The survey consists of 40 closed-ended questions, uses a Likert scale, and is divided into six sections: (1) general information, (2) work and professional trajectory, (3) undergraduate experience and training in science communication, (4) postgraduate and continuing education, (5) self-education, and (6) desired training.

Section one: this section examined the professional identity of participants using the following response categories: science popularizer, science communicator, science journalist, and none of the above. Participants are asked about their nationality, gender, country of undergraduate studies, whether they are professionally employed by a Chilean institution, and whether they hold a professional degree in journalism or a bachelor's degree in communication. The survey also asks about participants' region of residence, covering the 16 regions of Chile, which are grouped into six macro-zones: North (Arica and Parinacota, Tarapacá, Antofagasta, and Atacama), Center (Coquimbo and Valparaíso), Center-South (O'Higgins, Maule, Ñuble, and Biobío), South (Araucanía, Los Ríos, and Los Lagos), and the Metropolitan Region.

Section two: respondents were asked to indicate the type of institution in which they work, with options including: university; higher education center (non-university); state institution (non-university); private company (non-university); health center; museum; research center; laboratory or observatory with national or international funding; professional association; scientific society or academy;

project or program with a defined end date; media outlet; and school institution (elementary, secondary, or high school). Additional response options include other and not currently employed by any institution.

Participants were asked about the topics they had most frequently communicated or disseminated over the past five years, including health, environment, basic sciences, exact sciences, experimental sciences, social sciences, technology, and other areas. They were also asked to indicate the length of their professional experience in communication or dissemination, categorized as less than 2 years, 2–5 years, 5–10 years, 10–15 years, 15–20 years, and more than 20 years. This question also explored the continuity of participants' involvement in science communication and the specific subject matters they have communicated. We also inquired about the areas of knowledge in which disseminators had communicated over the past five years, based on the OECD classification and the fields defined by ANID, Chile's National Science Agency. Participants were asked to indicate their highest level of university education attained, with options including bachelor's or professional degree, master's degree, PhD, and incomplete undergraduate studies.

Section three: this section focused on training, considering undergraduate studies, experience completing courses, workshops, or seminars on science communication, as well as the duration of their work and self-evaluation as science communicators, popularizers, or disseminators. It also addressed postgraduate education and the geographic region where such specialization was pursued, including Chile, Latin America, the United States or Canada, Europe, Asia, Africa, and Oceania. Furthermore, participants were also asked about the highest university program they had completed in science communication, including diploma/postgraduate, master's, and doctoral degrees. Respondents who indicated they had completed postgraduate training or continuing education were asked to evaluate its impact on their professional work.

Section four: this section focused on self-education and included questions about the tools, activities, and professional experiences used, their types, and their perceived usefulness in enhancing understanding and communication of the scientific fields and subject matters in which participants work. Finally, they were asked about their desire to formally specialize in science communication. Respondents who answered NO were asked to provide their reasons, while those who answered YES were asked about the type of specialization they desired (e.g., short or long workshop, short or long diploma program, master's degree, or PhD), their preferred mode of study (online, in-person, or blended), their level of interest in specific disciplines (environment; health; physics; mathematics or engineering; astronomy; biology, chemistry, pharmacy; and social sciences or humanities), as well as the topics or skills they wished to develop.

Analysis

A descriptive statistical analysis, primarily based on frequency distributions, was conducted using SPSS software. This survey builds upon a previous research agenda undertaken by members of the team (Vernal et al., 2019). A total of 138 professionals participated in the study: 81 had a degree in social communication or journalism, and 57 had an undergraduate degree in other areas. The earlier publication reported only the findings from participants with undergraduate training in journalism and communication. In this study, however, results from the entire sample are reported. To enable comparison with the 2017 findings, a comparative analysis was conducted between participants holding a degree in journalism or undergraduate training in communication and those without such qualifications. This analytical approach identified significant differences between the two groups (journalists and non-journalists) within the 2023 sample, providing deeper insights into the composition of the contemporary science communication field. To conduct these comparisons, cross-tabulation analyses were performed using the chi-square statistical test.

RESULTS

Profiles of individuals practicing science communication in Chile

Of the 177 respondents, 53.7% reported having a background in journalism or communication, while 45.2% had training in other fields. Among the participants, 62.7% were female, 35.03% were male, and 2.2% selected non-binary or preferred not to say. The majority of respondents are Chilean (96.1%) and completed their undergraduate studies in Chile (94.4%). No significant differences were found in gender, nationality, or place of education between respondents with journalism or communication training and those without. Of those surveyed, 92% work professionally in Chile, with nearly half (49%) employed in the Metropolitan Region (MR). The second most represented geographic area among participants is the northern macro-region, accounting for 13.2% of the sample. Additionally, 10.1% of the participants work in the central macro-region, with an equal proportion employed in the south-central region. Both the southern and the austral macrozones show a rate of 8.8%.

When comparing respondents with a background in journalism or communication to those without, the latter are more likely to reside in the MR (54.5%).

Regarding professional identity, 40.1% consider themselves science communicators, 22% science journalists, 19.2% science popularizers, and 18.6% do not identify with any label. Statistically significant differences were found between respondents with journalism training and those with other types of training: $\chi^2(3)=44.62$, $p<.001$ (figure 1).

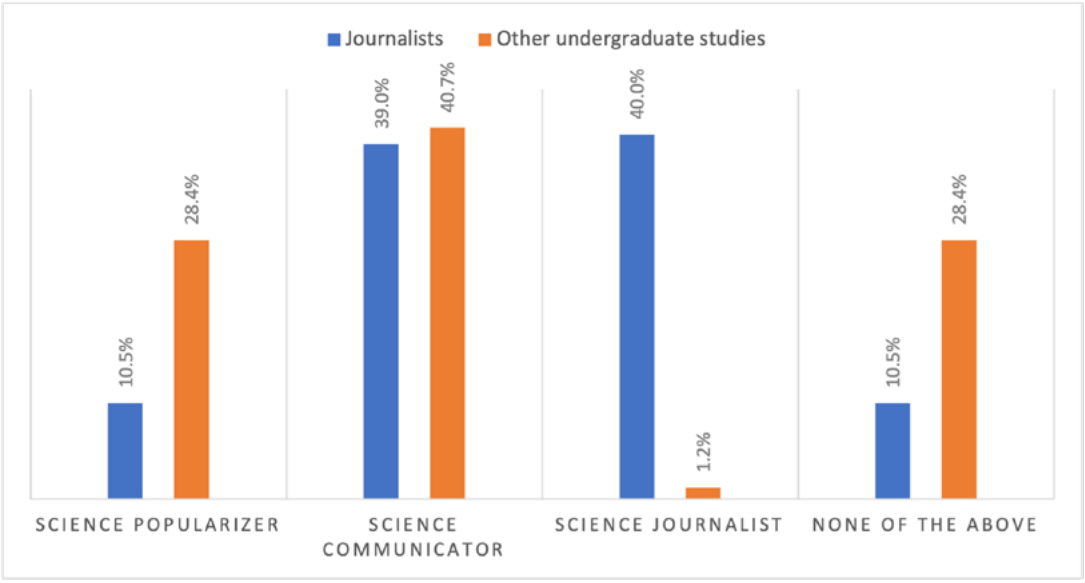


Figure 1. Professional identity according to undergraduate education

Source: Own elaboration.

Most people with a background in journalism or communication consider themselves science journalists (40.0%) or science communicators (39%). Among non-journalists, 40.7% identify as science communicators.

Regarding the type of organization where respondents work, the majority are employed at universities (37.9%), followed by research centers, laboratories, or observatories with national or international funding (19.2%). The third most common category is non-university state institutions (10.7%). A minority work in the media (5.1%) or on projects with a defined end date (4.5%). Other less common workplaces include non-university private companies (2.3%), school institutions (1.7%), professional schools, scientific societies or academies (0.6%), and museums (0.6%). Additionally, 1.7% of respondents indicated that they were not currently employed by any institution, while 7.9% selected the other category.

No respondents reported working in health centers or higher education institutions other than universities. Due to the large number of response categories, differences between participants with and without undergraduate training in communication were not analyzed for this question.

Regarding the duration of engagement in science communication or dissemination, most participants reported working in the field for between two and five years (24.5%) and between five and ten years (24.5%). Only 9.2% of respondents reported having worked in the field for more than 20 years. Additionally, 18.4% of respondents reported working in the field for between 10 and 15 years, 12.3% for between 15 and 20 years, and 11% for less than 2 years.

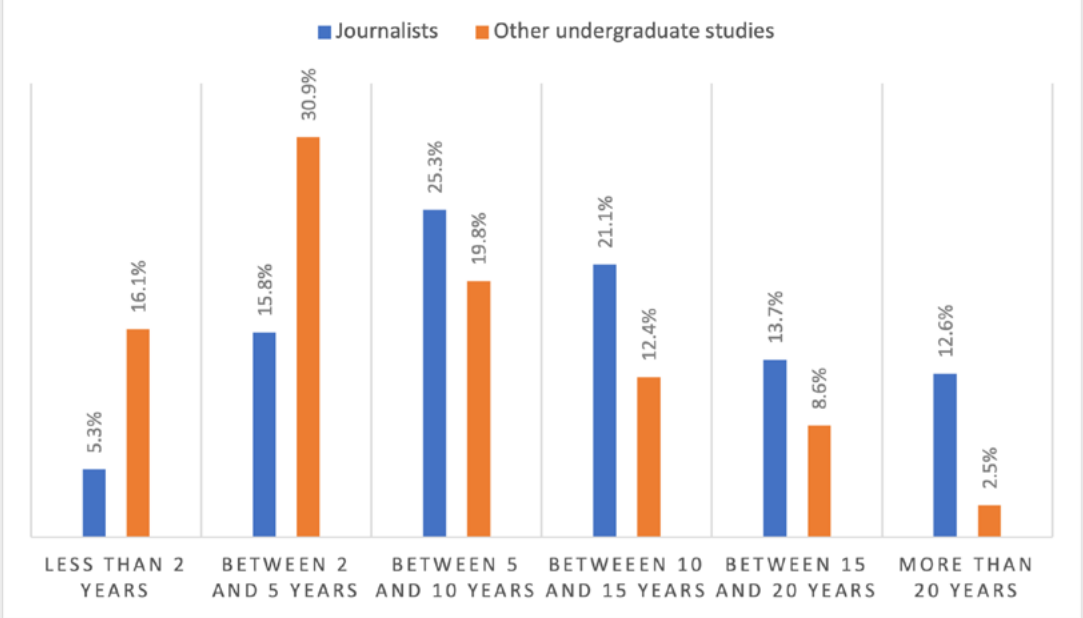


Figure 2. Years of professional experience by undergraduate education background

Source: Own elaboration.

A statistically significant difference was observed in the length of professional experience between respondents with undergraduate training in communication and those without, $\chi^2(5)=18.53$, $p<.01$. Among those with undergraduate training in communication, 46.4% reported working in the field for 10 years or more, whereas only 3.5% of respondents with other undergraduate backgrounds have over 10 years of experience (figure 2).

Subject matters communicated

Among the most frequently communicated topics over the past five years, the most prominent were the environment and the basic, exact, or experimental sciences, each reported by 28.8% of respondents. These were followed by health (14.7%), social sciences (9.2%), and technology (6.8%), while 11.7% of participants indicated that they had primarily communicated topics in other areas. Due to the large number of categories, differences between the two groups of science communication professionals were not analyzed for this item.

Academic training in the area of science communication

Regarding the highest academic level completed, 36.2% indicated having a professional degree or bachelor's degree, 35.6% indicated having a master's degree, and 19.8% reported having a PhD. Only one respondent indicated not having completed undergraduate studies. As mentioned above, 57% reported having an undergraduate degree in journalism or communications. Among respondents with undergraduate degrees outside the fields of communication or journalism, the

most common area of study was the basic, exact, or experimental sciences (33%), accounting for 73.9% of this subgroup. Other areas of undergraduate training were less represented and included education (3.0%), arts and humanities (2.1%), engineering (2.1%), and social sciences (1.1%).

Participants were asked whether they had taken any courses, workshops, or seminars related to science communication during their undergraduate studies. Sixty-five percent of respondents indicated they had not taken any such training, while 27.1% reported having completed a course or workshop in journalism or science communication—either as an elective (12.4%) or as a mandatory component (8.5%) of their undergraduate program. Statistically significant differences were found between respondents with a degree in communication or journalism and those without $\chi^2(1)=19.08$, $p<.001$. While 43.8% of the first group reported having taken some form of course, only 12.3% of the second group indicated the same (figure 3).

Overall, among participants who had some form of science communication experience during their undergraduate studies, the training was moderately valued in relation to their professional work as science communicators, popularizers, or disseminators, with an average rating of 3.52 (SD=1.11) on a five-point scale. For postgraduate training and self-education, mean ratings exceeded 4 across all categories (figure 4).

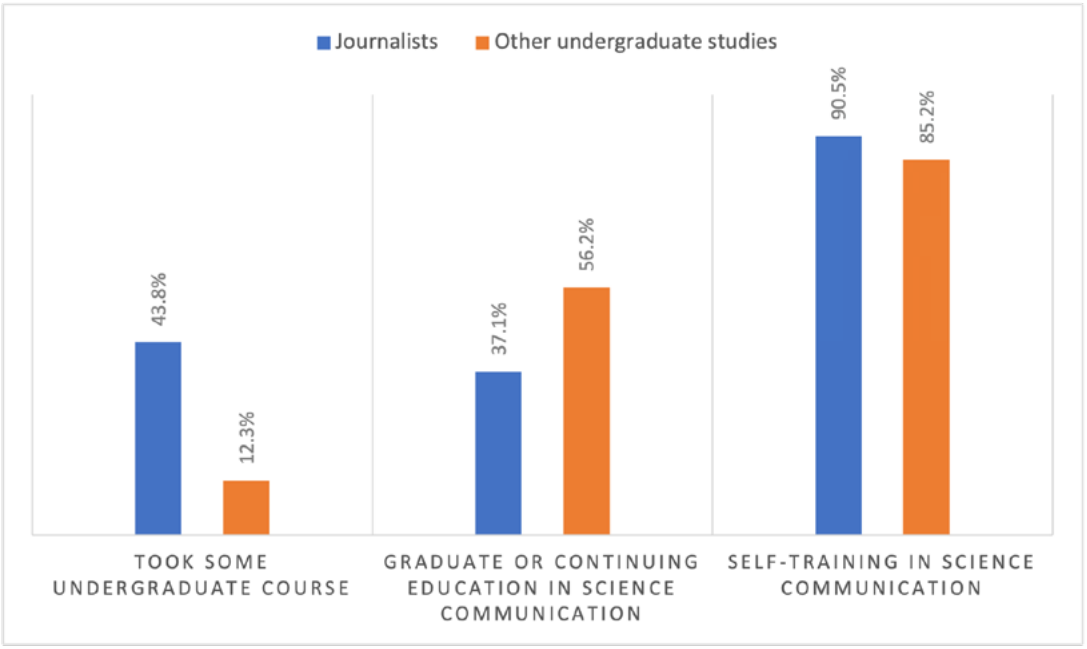


Figure 3. Types of training in science communication

Source: Own elaboration.

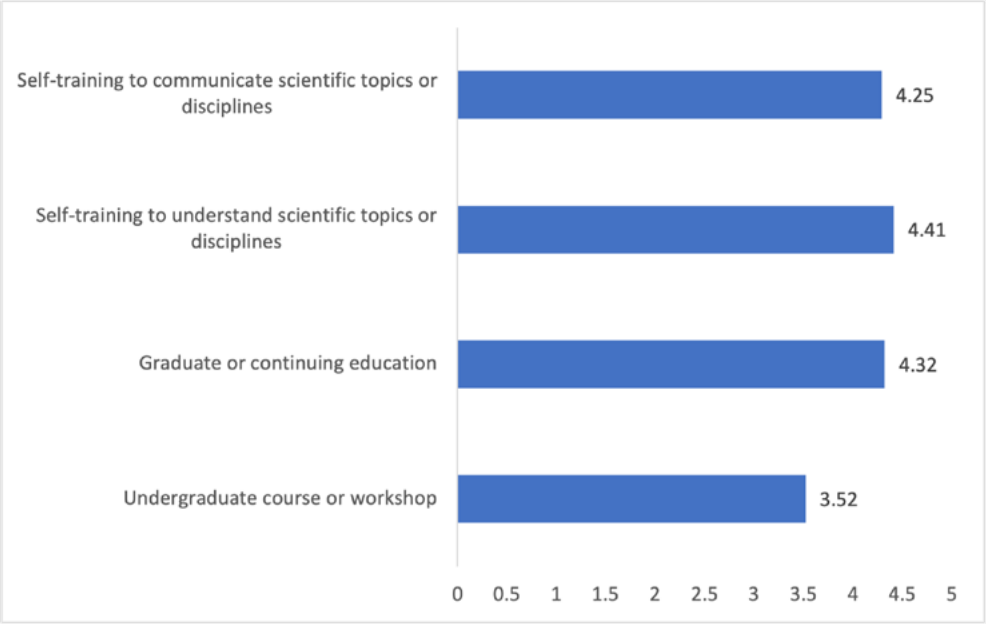


Figure 4. Average ratings of training experiences, on a 1–5 scale

Source: Own elaboration.

Postgraduate training oriented toward science, technology, knowledge, and innovation

Regarding postgraduate or continuing education in science communication, 41.8% of respondents reported completing studies at this level. Statistically significant differences were found in postgraduate or continuing education attainment between participants with undergraduate training in journalism or communications (37.1% hold a postgraduate degree) and those from other fields (56.2% hold a postgraduate degree), $\chi^2(1)=5.89$, $p<.05$. Among those with postgraduate degrees, most studied in Chile (77%), followed by Europe (17.6%), Oceania (2.7%), Latin America (1.4) and North America (1.4%). Among those with postgraduate studies, 72.6% reported specializing in a diploma or postgraduate certificate, 26.4% indicated a master's degree, and 1.4% a Ph.D. With regard to the perceived usefulness of postgraduate and continuing education for the practice of science communication, the assessment is quite positive, with an average score of 4.32 (SD=0.76) on a five-point scale.

Self-education and desired training

The last section examined self-education and interest in formal specialization. A total of 88.1% of respondents reported engaging in self-education, a common experience among participants both with and without undergraduate training in communication, as no significant differences were found between these groups: $\chi^2(1)=.43$, $p.05$.

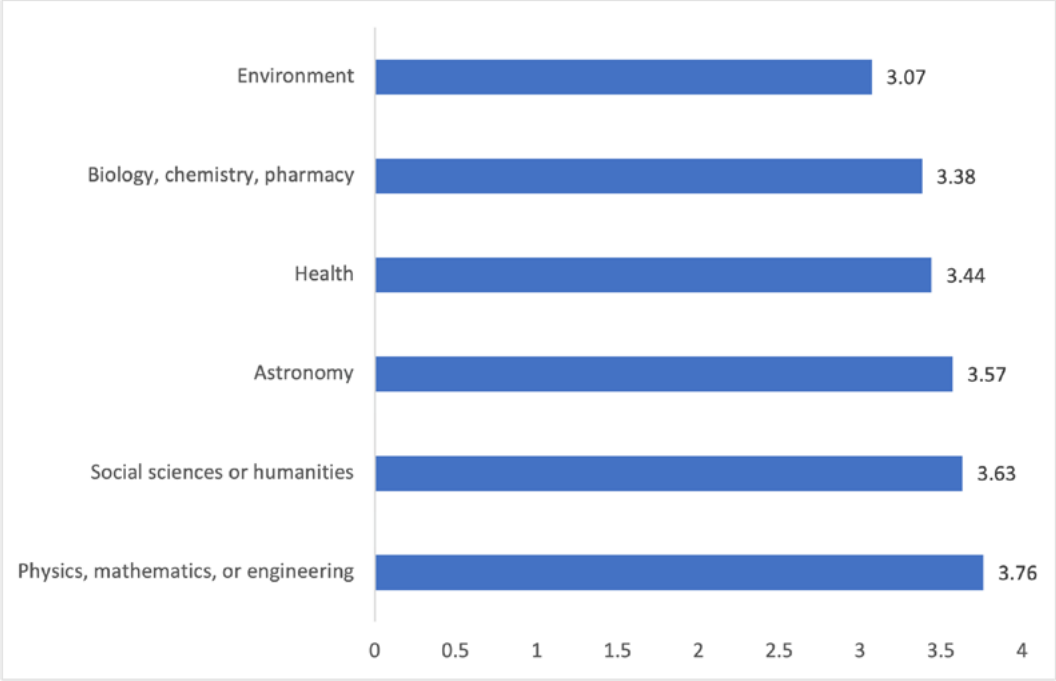
Regarding the perceived usefulness of self-education, respondents rated its value for better understanding scientific fields and subject matters with a mean of 4.41 (SD=0.70) on a five-point scale, while its usefulness for improving communication of these fields and subjects received a mean rating of 4.29 (SD=0.78). The most frequently used tools for this purpose were scientific articles and specialized books (77.1%), followed by science news (70.1%), conversations with scientists (66%), conferences, seminars, or talks (65%), popular science books (60.1%), documentaries, films, radio programs, or podcasts (54%), and, finally, conversations with other science communicators (52.1%); 1.1% indicated that they did not have a preference for any of the options.

The same question was asked regarding self-education tools, specifically focusing on their effectiveness in improving the ability to communicate scientific disciplines and topics. Among the seven non-exclusive options for self-education tools, the most highly valued were reviewing other science communication, popularization, or dissemination projects or programs in Chile and internationally (63.1%), followed by ongoing in-person dialogue and collaboration with fellow science communicators, popularizers, and disseminators (57.4%). These were followed by participation in conferences, seminars, or talks on science communication (51%); reading books or articles on science communication techniques, popularization, or dissemination (46.1%); engaging in virtual forums or mailing lists (41.1%); and adopting established science communication, popularization, or dissemination models (33.1%). Additionally, 7% of respondents indicated that they did not prefer any of the self-education tools listed above.

Regarding formal specialization in science communication, 71.8% of respondents expressed interest. Statistically significant differences were observed between journalists (67.4%) and non-journalists (76.5%) in their interest in receiving training in the field, with non-journalists showing a higher level of interest: $\chi^2(1)=4.24$, $p<.05$.

Among those interested in continuing their education in science communication, 30.5% preferred a master's degree, followed by 27.3% who favored a short diploma program (less than six months). Moreover, 10.9% expressed interest in a long-term diploma course (6–10 months), as well as in Ph.D. programs and short-term intensive workshops lasting 12 hours over one week or a weekend. Only 9.4% preferred a bimonthly workshop with two weekly sessions. The hybrid modality was preferred by 56% of participants, followed by virtual (29.1%) and face-to-face (14%) modalities.

Participants interested in further specialization were asked to rank six topics in order of interest, with 1 indicating the highest interest and 6 the lowest. The average scores for each topic were as follows: environment, 3.07 (SD=2.05); health, 3.44 (SD=1.71); physics, mathematics, or engineering, 3.76 (SD=1.78); astronomy, 3.57 (SD=1.7); biology, chemistry, or pharmacy, 3.38 (SD=1.79), and social sciences or humanities, 3.63 (SD=1.76) (figure 5).



Note: Lower values indicate higher interest.

Figure 5. Topics of interest for specialization in science communication

Source: Own elaboration.

Regarding the type of specialization they would like to pursue (14 alternatives, multiple responses), the most common were the development of science communication, popularization, or dissemination projects (70%); digital media (60%); and audiovisual techniques for general audiences (radio, podcasts, or TV) (58.1%). In contrast, the history of science and technology (21.1%) and the sociology and anthropology of science (28%) were mentioned less frequently.

A list of five compelling reasons was presented to those who did not want to specialize in the area. The most popular option was other reasons (40%), followed by I do not see the need for it (25.1%) and I do not have the time (22.1%). Insufficient supply, lack of motivation, and financial constraints together accounted for 11.1% of the responses.

DISCUSSION

This study aimed to characterize individuals engaged in science communication in Chile, updating the knowledge from earlier studies (Valderrama et al., 2014; Vernal et al., 2019). The results indicate that in the field of science communication, professionals with backgrounds in communication or journalism coexist alongside

those trained in other disciplines, primarily the basic sciences, who also participate in science communication and dissemination. An interesting distinction emerges in professional identity between journalists and non-journalists. The concept of science communicator is more inclusive and reflects the current diversity of professionals in this field.

The data also show a higher female representation in science communication, with approximately two-thirds of participants identifying as women, regardless of whether they held an undergraduate degree in journalism or communication. Wilkinson et al. (2022) reported similar findings in a survey of science communicators, noting that although science communication attracts many women, further in-depth investigation is needed on gender-related issues such as compensation, productivity, and harassment. Other studies in the field of science communication have shown the limited presence of women in science content within the media, highlighting a significant gender gap (Vernal-Vilicic & Reyes-Betanzo, 2024). Therefore, it would be valuable to investigate whether the increased presence of women in science communication correlates with a higher representation of female sources in specialized media content.

The primary employers of professionals in this field are universities, research centers, laboratories, and observatories with national or international funding. The media employs only a small group of those surveyed. Jobs are predominantly concentrated in the MR, confirming the centralization of scientific information coverage in the media (Martin-Neira, 2022), regardless of whether such coverage originates from or is disseminated by science centers. Regarding professional experience, journalists and communicators tend to have longer careers, suggesting that the inclusion of professionals with undergraduate training outside of science communication is a more recent development.

It is notable that science communicators have limited training at the undergraduate level. Although individuals with undergraduate degrees in journalism or related communication fields had greater access to training in science communication than those from other disciplines, fewer than half of the participants reported receiving such training during their undergraduate studies. This finding aligns with the limited academic offerings in science communication within journalism programs. The survey conducted by Vernal et al. (2019) found that 48% of journalism programs in Chile included courses related to science communication, representing a considerable increase compared to the 2012 assessment by Valderrama (2014), which found that only 21% of programs offered courses in this area. An update conducted in 2024 as part of this study, using the same methodology as previous surveys in Chile, indicates that 51% of journalism

programs now offer courses in this field. Half of these courses are elective and primarily focus on environmental issues. The elective nature of courses in science communication and science journalism appears to be a widespread practice across Ibero-American countries, where instruction in this field largely depends on student interest (Calvo-Rubio & Ufarte-Ruiz, 2021).

Despite this, the findings reveal limited development in the availability of courses in this area, at least within journalism programs. A valuable future direction for this research would be to examine the academic offerings of science communication and related courses within undergraduate science programs, given the growing presence of professionals with undergraduate training outside journalism and communication.

The survey results also indicate that the lack of undergraduate training in science communication is partially offset by postgraduate or continuing education in the field. Specialization is primarily pursued at the diploma level, with a preference for undertaking it within Chile. The decision to specialize at this level is more frequent among those with undergraduate studies in areas other than communication, which aligns with the findings of previous studies on the need to acquire communication tools to access this area of work (Elías, 2002). These findings are also consistent with those of Martin-Neira et al. (2024), who highlight the need for specialization in scientific subject areas as well as digital tools and media. This is consistent with the third national survey on social perception of science, technology, knowledge, and innovation (Ministerio de Ciencia, Tecnología, Conocimiento e Innovación, 2023), which indicates that a large proportion of individuals over the age of 15 in Chile obtain information about science and technology primarily through digital media and social networks.

These findings on postgraduate training align with the recent increase in the number of diploma programs in science communication. Currently, there are five diploma programs in science communication in Chile, offered by the University of Chile (Science Communication), the Pontifical Catholic University of Chile (Science Dissemination and Communication), the University of Santiago (Diploma in Public Science Communication and Community Engagement), the University of Antofagasta (Diploma in Science Communication), and the Pontifical Catholic University of Valparaíso (Diploma in Science Communication). Only two programs are offered outside the Metropolitan Region, three are delivered online, and the other two use a hybrid format; none are offered entirely in person. Three of the schools offering these programs are in the area of science, and two are in communication. As of 2024, no master's or doctoral programs in science communication were available in Chile. Consequently, consistent with

previous findings, those seeking advanced academic training in the field must pursue it abroad, which involves significantly higher financial and living costs (Vernal et al., 2019).

Given the limited academic offerings in Chile, self-education is widespread among those involved in science communication. Along with professional experience, these forms of training are the most highly valued by participants, surpassing undergraduate and postgraduate education. These findings are consistent with those of the 2017 survey (Vernal et al., 2019): despite the digital transformation, self-education still relies mainly on scientific articles, science news, and participation in conferences or seminars, reflecting a continued dependence on academic sources and tools. The assessment of workplace training also aligns with research on the professional profile of journalists in Spain (Cassany et al., 2018).

Most participants, regardless of their undergraduate education, expressed interest in continuing their education in science communication through master's degree programs in hybrid learning, with a strong preference for the areas of environment and health. This modality may reflect a training system that emerged during the pandemic, when postgraduate degrees were taught virtually (Sánchez & Álvarez, 2024; Gómez López, 2023). Moreover, the prioritization of the environment as a specialization likely reflects the respondents' areas of work and the global urgency of climate change.

The pandemic also highlighted the need for tools that enable science journalists and science communicators to address complex topics or confront misinformation in the media, even under conditions of multiple challenges and constant uncertainty (Martin-Neira et al., 2024; Fiscutean & Rosu, 2025).

In summary, the results of this study reveal the complexity and diversity of the science communication field in Chile, highlighting the coexistence of professionals from communication, basic sciences, and other disciplines. This diversity, manifested in variations in professional identity and training pathways, underscores the importance of adopting inclusive approaches that recognize the significant role of self-education and professional experience within a context marked by limited formal academic offerings.

This article highlights the need for public and academic policies that promote accessible, decentralized training aligned with current demands, thereby fostering high-quality scientific communication that contributes to the development of a more informed and equitable society.

The results of this study on the careers of science communicators in Chile contribute to the international discussion on the professionalization of science

communication. In addition to technical knowledge of science, it is essential to adapt to diverse communication channels and maintain a reflective perspective on one's own work. Consistent with the findings of this study, international research has shown that individuals working in science communication come from diverse backgrounds (including scientists, journalists, and those without formal scientific training) and develop their expertise through a combination of academic studies, practical experience, and specialized training (O'Brien et al., 2024; Roche et al., 2023). Studies in various contexts, such as China, reveal that the field's diversity generates tensions: scientists and citizens compete for legitimacy as communicators, with scientists perceiving themselves as more qualified due to their scientific training and moral authority (Yang, 2022). In terms of continuity with previous studies that have characterized the professional trajectories of science communication in Chile, this research could be extended to address new topics relevant to the field's future, such as strategies to strengthen the professional practice of science communication. This involves considering factors such as attitudes toward training, institutional recognition, development opportunities, intersectoral coordination, and working conditions, particularly regarding gender and territorial gaps between Santiago and other regions. Future studies could broaden the focus by incorporating organizational approaches that analyze the positioning of science communicators within media outlets (Kristiansen et al., 2016) and institutions (Schäfer & Fähnrich, 2020). These elements are essential for understanding the trajectories and tensions that shape the profession and for consolidating a sustained, high-quality culture of science communication.

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ABOUT THE AUTHORS

TERESA VERNAL

0000-0002-4216-5183

Ph.D. in Social Communication from the Universidad Pompeu Fabra. Professor at the School of Journalism, within the Faculty of Architecture, Art, Design, and Communications, at the Universidad Andrés Bello. She is currently dedicated to teaching and research in the fields of communication, science, and education. She has researched the emergence of science journalism in Chile, the perception of science in schools, and the valuation of cultural heritage.

MACARENA PEÑA Y LILLO

0000-0002-2422-571X

Ph.D. in the History of Science and Science Communication. Professor at the School of Journalism of the Faculty of Humanities of the University of Santiago de Chile (USACH). Researcher at the Center for Public Communication Studies (CECOMP) and the Center for Studies in Science, Technology, and Society (CECTS). She specializes in the history of science communication, disaster risk studies, social studies of science and sociotechnical controversies.

LORENA B. VALDERRAMA

0000-0002-3794-692X

Ph.D. in Communication from the University of Illinois at Urbana-Champaign, United States. Associate Professor at the Faculty of Communication and Literature of the Universidad Diego Portales. Director of the Communication, Literature, and Social Observation Research Center (CICLOS UDP) and associate researcher at the Millennium Nucleus on Digital Inequalities and Opportunities (NUDOS). Her research focuses on science and health communication.