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## The Role of Science Communication in Building Trust in Scientific Expertise

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### Introduction

Science communication involves the transmission of scientific knowledge in a simple and accessible manner to a wider audience, and this can be quite a complex task. The communication of scientific knowledge can be unidirectional or bidirectional (Lewenstein, 2003) and comprises a relationship of trust involving experts who may be located at different levels and degrees of complexity. For example, with policymakers, the trust they have in an expert allows them to rely on the data provided and to feel supported in decision-making processes, particularly when it comes to public risks (Dierkes & von Grote, 2005; Intemann, 2023), such as the global COVID-19 pandemic. However, not only policymakers establish relationships of trust with experts, but the public also often depend

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on such relationships to help the decision-making process (Intemann, 2023).

Trust, as a broader concept, refers to what brings society together. Since science plays an important role in society and in the public debate (Peters & Dunwoody, 2016), trust in science is also crucial to the functioning of democracy and governance (Gundersen et al., 2022). Relationships of trust involve an exchange between parties, as Gibbons' tacit contract exemplifies (1999), and they are based on a social construction that must be nurtured. These relationships of trust with experts require, therefore, a belief in their competence within a given area of knowledge, their integrity, and honesty (Hendriks et al., 2015; Intemann, 2023; Mayer et al., 1995). These relationships may have a social dimension involving the "reception, transmission, and uptake of scientific knowledge" through social forces whose influence can benefit or harm trust in science (Contessa, 2022). Therefore, the institutions that lead the public to place their trust in an expert are relevant, particularly when facing critical social situations that can jeopardise trust in science and organisations (Steijaert et al., 2021).

The professionalisation of science and resulting scientific specialisation has caused a gap between the language of science and the reality in which the public move (Bensaude-Vincent, 2001), and between the scientific community itself and the audience. That, together with a lack of scientific literacy (Bauer, 2009), may have contributed to the emergence of the fake news and misinformation that have recently become associated with science—a development that has placed a further strain on trust relationships (Mihelj et al., 2022). Nevertheless, when an individual identifies sources of scientific information, such as journalists, teachers, doctors, or scientists, that individual should be able to place their trust in these sources of mediation communication, assured that the information they receive is correct and up to date (Wynne, 1998).

Questionnaires have been used to understand how trust arises when it comes to sources of information regarding science and technology (S&T) topics. In this chapter, the results of such a survey focusing on trustworthy sources of S&T information, involving students and teachers at a Portuguese university, are presented. These data alone may not be representative of the Portuguese population but are relevant when

compared with the available results from Eurobarometer surveys (European Commission, 2010, 2013, 2021) of with public perceptions of sources of S&T information. This comparison allows us to understand the Portuguese reality over the last 13 years, but also to comprehend the vision of students and teachers at a science and engineering faculty, and to see if their perceptions differ from the society trends in the most recent Eurobarometer. By understanding the main types of sources on which the respondents rely for S&T, it is possible to clarify which are the most important information sources and thus to locate a starting point for taking a closer look at science communication.

## Trust in Science, Risk Society, and Science Communication

A risk society is one where the role of science is focused on its importance for the recognition and legitimisation of risks that society faces (Beck, 1992; Wynne, 1992, p. 300). Modern society's distrust of science is related to the negative impacts of scientific developments, especially during World War I and World War II (Beck, 1992). The way in which a given risk is perceived may differ depending on the role it plays in the process of the production and use of knowledge: For scientists and policymakers, risk often manifests as a set of probabilities; for the public, risk can be a very concrete fear or concern. As science plays a significant role in the assessment and management of risks, the public's attitudes towards science can condition the way in which the public perceive and act towards risks (Delicado & Gonçalves, 2007). The debate surrounding S&T in twentieth-century Europe was transformed considering its social, political, and economic context and went from an optimistic and confident perspective to a more pessimistic and sceptical view (Cheng et al., 2008; Dierkes & von Grote, 2005).

Trust can be a way of delegating responsibility to others (Cologna & Siegrist, 2020), and public trusting in science is the result of a mediated communication (Schäfer, 2016). Since most segments of the public are unlikely to be in regular touch with scientists or go to science fairs or museums, their access to scientific knowledge takes some mediated

form or other (e.g., communication through magazines, TV, internet, etc.), which means that public trust in science can be influenced by media representations (Schäfer, 2016). Trust in specialised systems and in science is, thus, a condition of everyday life (Giddens, 1990), considering that we live in a society experiencing risks that are difficult to control and that may have cross-border consequences that can be serious for us as human beings (Beck, 1992; Ojala, 2021). Yet, trusting science and its institutions means trusting that reliable knowledge is being produced, from which it will be possible to improve numerous aspects of life, thus allowing scientific knowledge to be fed into political decision-making and public debates (Schäfer, 2016).

Science communication is among the factors that can influence public trust in science (Miller, 2004). It is a mechanism that seeks to fill the gap between expert and lay ways of understanding science, which is based on the historical idea that the public is a passive consumer (Cooter & Pumfrey, 1994). This gap was created when the scientific community, having established its identity, separated itself from the public (Bensaude-Vincent, 2001), thus creating a breach between science and the public and even between scientific experts from different scientific areas. Characteristic of the twentieth century, and related to the risks and mistrust in science, this gap became noticeable through the gradually increasing need for mediation. Yet, the development of science communication practices underlies the idea that S&T could be complicated for the public to understand. That idea was based, firstly, on scientific communication and, secondly, on the lack of mediation of increasingly complex S&T, as well as on the idea of transforming a more specialised type of knowledge into public knowledge (Bucchi, 2008). This perspective on science communication is described as “diffusionist” (Bucchi, 2008), it consists of scientific knowledge that must move from specialised knowledge to popular knowledge, and it is divided into two aspects. The first is the legitimisation of the role of mediators, such as science communicators and journalists, at both a social and a professional level. The second aspect is the role of scientists in the communication process, who may feel distanced or feel a need to criticise mediators for distorting or sensationalizing the knowledge they convey (Bucchi, 2008). This notion of a division between science and public, when it comes to science

communication, has perpetuated the idea of the media as incapable of filtering and reflecting on scientific knowledge, as well as the notion that the public do not have the ability to understand scientific discoveries (Broks, 2006).

Although scientific literacy plays a structuring role in the public knowledge of S&T and in the resulting decision-making within society, it implies that the public has a knowledge deficit (Bauer, 2009). The idea of a knowledge deficit emerged in the 1980s as a result of studying the public understanding of science by social scientists, and it is characterised by the belief that the public's lack of trust in S&T is due to their lack of adequate knowledge combined with their inability to appreciate science (Dickson, 2005; Kim, 2007; Lewenstein, 2003). If the public overcame this knowledge deficit, it would perceive S&T as positive (Dickson, 2005), which would lead to a more positive attitude towards both (Irwin & Michael, 2003).

In the 1980s, this deficit in scientific knowledge was being studied in the context of public attitudes towards science and with a view to the then political need for a more positive attitude in society towards scientific research (a science communication model called public understanding of science) (Royal Society, 1985). Another type of deficit was identified in the 90s, this time associated with the lack of public trust in S&T due to the negative societal consequences of the uses they were being put to and/or the secrecy of the research itself, which is common to Big Science and Big Technology projects (Schiele, 1994). Additionally, the scientific community did nothing to contact the public, nor to understand it or its plurality, which in turn led to an even greater lack of interest in science and consequently to scientific illiteracy (da Costa & Conceição, 2007).

These several studies on the multiple science communication models are not consecutive, nor do they exclude one another (Bauer, 2009; Lewenstein, 2003). However, the public participation model (or public engagement with S&T) emphasises the importance of social trust built through public debates on S&T, aiming to improve public participation and trust in scientific policies. Science shops, public debates, or science fairs aim to remove the exclusivity of scientific knowledge from the experts and share it with the public (Lewenstein, 2003), and such

initiatives are also a response to the need for citizens to be involved both in discussions and dialogues between S&T and, subsequently, in decisions that can affect them directly or personally. Following this idea, science communication can, therefore, play an important role in building a relationship of trust between experts and the public and can represent the solution to the society's crisis of confidence in S&T.

With this in mind, the Portuguese public's opinion regarding science, their confidence in, and perceptions of risks involved in S&T are interesting to understand. Delicado and Gonçalves' Portuguese survey in 2007 did not reveal a large difference in favourable and negative opinions regarding science: 55% of the surveyed population considered the benefits of science to be greater than the risks, although some concern among the respondents regarding this topic can be inferred. When it comes to resolving risks, the Portuguese trust that science can indeed help do this, with 80% of respondents saying they have confidence in science. Regarding the importance of science in making decisions that affect public issues, 88% of the respondents considered a scientific input to be relevant, demonstrating confidence in science as a problem-solver (Delicado & Gonçalves, 2007).

## Case and Methods

This chapter results from doctoral research carried out between 2018 and 2021. Its main objective was to analyse a S&T collection of scientific popularisation books—*Ciência Aberta*, from Editora Gradiva in Portugal—exploring all the books published between 1982 and 2018 and considering all their different components, from appearance to writing. Authors and scientists who have published books or book chapters in this collection over the years were interviewed in order to comprehend their relationship both with the tool—science communication and dissemination books—and with the public. Finally, the higher education community was surveyed to find out what influence these books have had. Mixed methods, including methods for collecting and processing quantitative and qualitative data, were the best-suited option for both the quality and type of data in this research (Tashakkori &

Teddle, 2009). Data collection techniques thus included content analysis, semi-directive interviews, and questionnaire surveys that complied with the General Data Protection Regulation.

An online survey was developed to gather information from students and teachers at NOVA University of Lisbon alongside surveys designed to measure public understanding of science. These surveys focused on levels of interest, information, and, especially, trust in a variety of sources of information regarding in S&T (Centro de Gestão e Estudos Estratégicos, 2017). These two groups were studied since the type of science communication books involved were more specialised than “ordinary popular science”, hence the focus on a higher education institution. In connection with measuring trust in sources of information on S&T, students and teachers were asked to choose between several options which ones they considered more and less reliable when it comes to scientific topics. The options were as follows: journalists, doctors, scientists working in private companies, religious institutions, scientists at universities or public research institutes, representatives of environmental organisations, politicians, teachers, the military, writers, and artists.

The two surveys conducted among students and teachers were carried out in different months, which made it possible to change some questions along the way, since there were details in each survey that did not apply to both audiences. The student survey was carried out first (February 2020), using a curricular unit at NOVA University of Lisbon, Faculty of Sciences and Technology, in which students from all the faculty’s courses are enrolled. Surveys were sent by email, with a direct link to Google Forms where the survey was done. The teachers’ survey was conducted subsequently (June 2020), within the same faculty, also with a direct link to Google Forms sent by email to the faculty teachers’ mailing list. As noted, the survey had been slightly modified for this round.

Despite the differences between the two surveys, the trust-related questions analysed in this chapter were conducted in very similar ways for both audiences, thus allowing for an accurate comparison. The statistical data that resulted from the pre-pandemic survey—the students—and from the early pandemic survey—the teachers—were compared

with the data resulting from the European S&T-focused” surveys “Eurobarometer,<sup>1</sup> from the years 2010, 2013, and 2021, representing different times and perspectives on the same topics. Below, data from these polls related to attitudes towards S&T are analysed and compared with those from the survey carried out at NOVA.

Considering the survey respondents from the higher education community, it is important to note that the  $n$  (total) of students is 394, of which 90% ( $N = 358$ ) are between 19 and 20 years of age, 56% are male ( $n = 222$ ), 43% female ( $n = 167$ ) and 1% identified as “other” ( $n = 5$ ). Of these 394 students, 73% live in the Lisbon Metropolitan Area ( $n = 287$ ). In the case of teachers, the  $n$  (total) is 138 and, in terms of age, 66% are between 41 and 60 years of age ( $n = 92$ ). In terms of gender, 49% are female ( $n = 67$ ) and 51% are male ( $n = 71$ ). Of the 138 teachers ( $n = 138$ ), 97% live in the Lisbon Metropolitan Area ( $n = 134$ ).<sup>2</sup>

## Analysis

The data from the survey helped to reveal trends regarding the extent to which people trust in various information sources when it comes to S&T, with a special focus on a higher education community linked to science and engineering. It should be noted that, given that each student was able to choose three options in response to this question, it brings the total number of answers to 1182 (three times the number of respondents). Regarding the sources of scientific information to which students attribute the highest degree of trust, 31% consider scientists at universities or public institutes of research ( $n = 370$ ) to be the most reliable source of information when it comes to scientific topics, followed by scientists working for private companies who scored 20% of students’

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<sup>1</sup> Eurobarometer surveys are a polling instrument from European institutions, to regularly screen the public opinion in European countries on several questions, including attitudes towards S&T (European Commission, 2010, 2013, 2021). These polls, initiated in 1974, allow for a long-term view.

<sup>2</sup> Surveys were sent to ~1000 students and ~500 teachers. Thus, the response rate was ~40% for students and ~30% for teachers.

responses ( $n = 234$ ). This is followed by doctors, with 17% of students registering this option as the most reliable ( $n = 197$ ), then teachers with 16% ( $n = 188$ ), then journalists with 6% of students regarding them as the most reliable sources on science topics ( $n = 72$ ). Representatives of environmental protection organisations are the choice of 6% of students ( $n = 66$ ), writers are the choice of 2% ( $n = 24$ ), the military register 1% of student responses ( $n = 17$ ), while religious institutions and artists are favoured by 1% of students each ( $n = 6$ ). Politicians are the choice of only 2 students as the most reliable source on science topics.

When asked which sources of information they trust the least for science-related information, the results for the students are practically inverted in relation to the previous question: Religious people are the least trusted source of information, with 26% of students indicating this option ( $n = 313$ ), closely followed by politicians with 25% of responses ( $n = 295$ ), and artists with 18% of responses ( $n = 219$ ). Journalists are the fourth least trustworthy source according to students, with 13% of responses ( $n = 160$ ), followed by the military ( $n = 70$ ), writers ( $n = 48$ ), and representatives of environmental protection organisations ( $n = 32$ ). Scientists working for private companies were the choice of 31 students, followed by doctors with 7 votes, 5 votes for teachers, and 2 for scientists at universities or public research institutes.

Considering the sources of information to which teachers attribute the greatest amount of trust, they referred to scientists at universities or public research institutes. This option recorded around 50% of the responses ( $n = 135$ ), meaning only three teachers have not registered this option as the most reliable one. Next are teachers, with 22% of the answers in this option ( $n = 60$ ), then doctors with 14% ( $n = 39$ ), and scientists who work for private companies which was the response from 10% of the teachers ( $n = 28$ ). Representatives of environmental organisations ( $n = 5$ ), journalists ( $n = 4$ ), writers ( $n = 3$ ), and the military ( $n = 2$ ) are the sources of information least favoured by teachers as the most reliable regarding science topics. Religious people, artists, and politicians did not receive any responses. It should be noted that teachers were able to choose two options in their responses to this question, which brings the total number of answers to 276 (two times 138 teachers).

Regarding sources of information in whom teachers trust the least, the option politicians is the first one, with close to 30% of responses ( $n = 82$ ), followed by religious institutions with around 25% ( $n = 68$ ), and journalists as the third least trusted source in relation to these topics, with 20% of responses ( $n = 55$ ). Artists received close to 10% of teachers' responses as unreliable sources ( $n = 29$ ), followed by the military with 8% of responses ( $n = 23$ ). Representatives of environmental organisations ( $n = 10$ ), scientists working for private companies ( $n = 6$ ), and writers ( $n = 3$ ) are among the options with the fewest votes from teachers, with the options "scientists at universities or public research institutes", "doctors", and "teachers" not receiving any votes (Table 3.1).

It is interesting to note that, when asked about the sources of information they trust the most, teachers point first to scientists at universities or public research institutes, then teachers and doctors, and then scientists working for private companies. On the other hand, when it comes to the least trustworthy sources, teachers consider scientists working for private companies to be less reliable sources than scientist working at universities.

Comparing the two surveys from NOVA, comprising more than 500 individuals including students and teachers, the same option is clearly chosen as the most reliable ones when it comes to scientific topics: scientists at universities or public research institutes. The second most reliable

**Table 3.1** Sources of information students and teachers trust most

	Students	Teachers
Scientists at universities or public institutes for research	31%	49%
Scientists working for private companies	20%	10%
Doctors	17%	14%
Teachers	16%	22%
Journalists	6%	1%
Representatives of environmental protection organisations	6%	2%
Writers	2%	1%
Military	1%	1%
Religious institutions	1%	0%
Artists	1%	0%
Politicians	0%	0%

source varies: the students look to scientists working for private companies. For teachers, the second most reliable source is teachers. The third option is the same in both cases: doctors constitute a very reliable option for both students and teachers. It should be noted that, in the eyes of both students and teachers, journalists are far from the most reliable sources in terms of science topics. Comparing students' and teachers' responses regarding the least trustworthy sources, politicians and religious people stand out, being the two least trustworthy options for both groups of respondents. For teachers, the third least reliable source is journalists, while for students it is artists. It should also be noted that scientists who work for private companies, despite accounting for less than 5% of responses in both cases, are regarded as less reliable, ahead of doctors and teachers (Table 3.2).

The Special Eurobarometer 401 (2013)<sup>3</sup> reported on sources considered best qualified to explain the impact of scientific and technological developments. In 2013, 54% of Portuguese respondents viewed scientists at universities and government labs as the best qualified, up 1%

**Table 3.2** Comparison of data between Special Eurobarometer 240 (2010) and Special Eurobarometer 401 (2013)

	2010		2013	
	Portugal	EU	Portugal	EU
Scientists working at universities and government laboratories	53%	63%	54%	66%
Scientists working for private companies or laboratories	29%	32%	33%	35%
Television Journalists	24%	20%	24%	20%
Newspapers journalists	17%	16%	12%	15%
Medical doctors	23%	26%	23%	19%
Environmental protection associations	24%	24%	18%	21%
Politicians	6%	6%	5%	4%
Writers and intellectuals	2%	6%	4%	7%
Military	2%	2%	1%	3%
Religious institutions	3%	2%	1%	1%

<sup>3</sup> Although there is no straightforward relation between considered best qualified and most trustworthy sources, since the possibility of answer is the same, I consider it important to refer the 2013 results.

from 2010, but 12% below the EU average (66%). Scientists in private companies were second-best at 33%, up 4% from 2010, but 2% below the EU average (35%).

24% of Portuguese respondents trusted television journalists, compared to the EU average of 20%. Doctors were trusted by 23%, unchanged from 2010, versus 19% in the EU. Environmental protection associations were chosen by 18%, down 6% from 2010, with a 21% EU average. Newspaper journalists were trusted by 12%, down 5% from 2010, compared to 15% in the EU.

Politicians were considered qualified by 5%, down from 6% in 2010, with a 2% EU average. Writers and intellectuals were trusted by 4%, up 2% from 2010, while the EU average was 7%. The military was trusted by 1%, down from 2% in 2010, mirroring the EU average. Representatives of religious institutions were trusted by 1%, down from 3% in 2010, with a 2% EU average (Table 3.3).

According to the 2021 Special Eurobarometer 516, 61% of European citizens consider public sector scientists the most trusted sources on scientific and technological developments. This is followed by private sector scientists (40%), doctors (29%), journalists (19%), and environmental protection associations (16%). Writers and intellectuals (10%), politicians (5%), military (3%), and religious representatives (2%) were less preferred.

**Table 3.3** Comparison between the results from 2020 Portuguese Higher Education survey and 2021 Special Eurobarometer 516

	Portugal 2020	Europe 2021
Scientists working at universities and government laboratories	74%	61%
Scientists working for private companies or laboratories	56%	40%
Doctors	24%	29%
Journalists	20%	19%
Environmental protection associations	23%	16%
Writers and intellectuals	8%	10%
Politicians	1%	5%
Military	1%	3%
Religious institutions	1%	2%

In Portugal, 74% of respondents consider public sector scientists the best qualified, 13% above the EU average and up 20% from 2013. Private sector scientists are chosen by 56% (16% above EU average, up 23% from 2013), and doctors by 24% (5% below EU average, up 1% from 2013). Journalists are trusted by 20% (1% above EU average), with TV being the primary source. Environmental protection associations are preferred by 23% (7% above EU average, up from 18% in 2013). Politicians are trusted by 1% (4% below EU average, down from 5% in 2013), religious representatives by 1% (1% below EU average, same as 2013), and the military by 1% (2% below EU average, same as 2013). Writers and intellectuals are chosen by 8% (2% below EU average, up from 4% in 2013).

Despite the limitations arising from the research itself (the methodology used was not the same), it is possible to deduce some trends comparing these two surveys. In all cases, when it comes to the most reliable or best qualified sources, students, teachers, and Portuguese citizens alike choose scientists at universities or public research institutes. The second most reliable source is, both for students and for most Portuguese respondents, scientists working for private companies, but in the case of teachers, this is not their second choice. The third most reliable or best qualified source for dealing with scientific development is the same in both surveys: students, teachers, and Portuguese respondents consider doctors the third most reliable source. The trend towards politicians, religious institutions, and the military is also similar in all surveys: These sources are considered the least trustworthy or least qualified sources by most Portuguese respondents, students, and teachers. The trend regarding representatives of environmental organisations and writers is also similar: Students, teachers, and Portuguese citizens at large do not consider them the most reliable or best qualified sources, but nor do they consider them particularly poor sources. A special case is that of journalists: While the Eurobarometer results show that they are considered reliable and qualified sources for dealing with science-related issues by around 20% of respondents, this is not the case in the survey of students and teachers, who consider journalists to be one of the least trustworthy sources on these topics.

## Discussion and Conclusion

Analysing the amount of trust lodged in or the likelihood of choosing these sources of information as the better informed when it comes to S&T in four different periods (European Commission, 2010, 2013, 2021; Navalhas, 2023) allows us to see some particularities of Portuguese society. The 2020 survey, despite only being carried out among a specific demographic segment who have a different relationship to S&T from that of the rest of the population, shows the same trend as the 2021 Eurobarometer. The sources of information that students, teachers, and the Portuguese respondents trust most for information about S&T are scientists, whether they work at universities or for private companies. The information sources that score the highest amount of trust, not only among S&T students and teachers, but also, according to the latest Eurobarometer (European Commission, 2021), in the Portuguese population, are scientists working at universities or public institutes and scientists working in the private sector.

As Gibbons' tacit contract states (1999), the social construction that provides them with authority should be nurtured by the scientists, who are the experts and who must try to pass on messages related to their areas of expertise (Royal Society, 1985). This can be an important step in creating the conditions for trust, so that their audiences recognise them as reliable and trust them easily. Therefore, science communication can be extremely important when considering these relationships of trust.

Already playing an important role for the public, by informing about what is currently happening in scientific fields, science communication can also be a strategic tool for experts to build more trusting relationships with their audiences. Intemann (2023) identifies several errors that can undermine the public's trust in scientists, and these include mixed messages that damage trust in scientists, not only regarding the scientific topic at hand, but also other topics. Focusing on scientific results rather than revealing the processes and methods of science is a mistake also pointed out by Intemann (2023), and this concerns the fact that the public, for the most part, do not understand the process a scientific theory goes through until it is regarded as proven. So, problems may arise when it comes to building up the public trust in experts.

The use of technical jargon is another misstep that can undermine public trust, distorting many of the objectives of science communication. When an expert uses technical jargon, the public may doubt whether that expert is really working in the public interest, or it may be perceived as the expert not caring whether the public understand what is being conveyed (Intemann, 2023). Not addressing specific audiences as such but considering the public to be a single entity is another mistake, according to Intemann (2023): different audiences may have different interests and needs that must be understood, and the scientist's speech must thus be tailored to them. Exaggeration in the expert's communication, causing alarm and being too pessimistic, is also an error that the author points to as undermining trusting relationships between experts and public. This may be linked to the fact that the surveyed students and teachers considered journalists as a not reliable source of information regarding science and technology.

The use of science communication to build stronger relationships of trust is possible, but it is necessary to avoid the mistakes mentioned above, as well as seeking to communicate responsibly. Transparency in issues of uncertainty is a good way for experts to present their work, as several studies have shown that this approach not only does not damage public trust in experts, but can even improve it (Jensen, 2008; Retzbach et al., 2016). Explaining clearly how science works, the processes it goes through, and the methods underpinning it (Weingart & Guenther, 2016) are strategies that can help the public to not only better understand the expert, but also to trust that the information and the data are reliable and trustworthy.

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## References

- Bauer, M. (2009). The evolution of public understanding of science—Discourse and comparative evidence. *Science, Technology, and Society*, 14(2), 221–240. <https://doi.org/10.1177/097172180901400202>
- Beck, U. (1992). *Risk society—Towards a new modernity*. Sage.
- Bensaude-Vincent, B. (2001). A genealogy of the increasing gap between science and the public. *Public Understanding of Science*, 10(1), 99–113. <https://doi.org/10.3109/a036858>
- Broks, P. (2006). *Understanding popular science*. McGraw-Hill Companies, Incorporated.
- Bucchi, M. (2008). Of deficits, deviations and dialogues: Theories of public communication of science. In M. Bucchi & B. Trench (Eds.), *Handbook of public communication of science and technology* (pp. 57–76). Routledge.
- Centro de Gestão e Estudos Estratégicos. (2017). *A ciência e a tecnologia no olhar dos brasileiros – Percepção pública da C&T no Brasil – 2015*. Brazil.
- Cheng, D., Claessens, M., Gascoigne, T., Metcalfe, J., Schiele, B., & Shi, S. (Eds.). (2008). *Communicating science in social contexts—New models, new practices*. Springer.
- Cologna, V., & Siegrist, M. (2020). The role of trust for climate change mitigation and adaptation behaviour: A metanalysis. *Journal of Environmental Psychology*, 69, 1–33.
- Cooter, R., & Pumfrey, S. (1994). Separate spheres and public places: Reflections on the history of science popularization and science in popular culture. *History of Science*, 32(3), 237–267. <https://doi.org/10.1177/007327539403200301>
- Contessa, G. (2022). It takes a village to trust science: Towards a (thoroughly) social approach to public trust in science, *Erkenntnis*, 88, 2941–2966.

- da Costa, A. F., & Conceição, C. (2007). Cultura Científica e modos de relação com a ciência. In *Sociedade e Conhecimento, Portugal No Contexto Europeu* (Vol. II, pp. 61–83). Celta Editora.
- Delicado, A., & Gonçalves, M. E. (2007). Os portugueses e os novos riscos: Resultados de um inquérito. *Análise Social*, 42, 687–718.
- Dickson, D. (2005). *The case for a “deficit model” of science communication*. Presented at Public Communication of Science and Technology, Working Symposium on ‘Strategic Issues in Science and Technology Communication’, Beijing, China.
- Dierkes, M., & von Grote, C. (Eds.). (2005). *Between understanding and trust—The public, science and technology* (pp. 4–26, 41–51, 54–88). Routledge.
- European Commission. (2010). Special Eurobarometer 340. *Science and Technology*.
- European Commission. (2013). Special Eurobarometer 401. *Responsible Research and Innovation (RRI), Science and Technology*.
- European Commission. (2021). Special Eurobarometer 515. *European citizens’ knowledge and attitudes towards science and technology*.
- Gibbons, M. (1999). Science’s new social contract with society. *Nature*, 402. <https://doi.org/10.1038/35011576>
- Giddens, A. (1990). *The consequences of modernity*. Polity Press.
- Gundersen, T., Alinejad, D., Branch, T. Y., Duffy, B., Hewlett, K., Holst, C., Owens, S., Panizza, F., Tellmann, S. M., van Dijck, J., & Baghrmian, M. (2022). A new dark age? Truth, trust, and environmental science. *Annual Review of Environment and Resources*, 47, 5–29.
- Hendriks, F., Kienhues, D., & Bromme, R. (2015). Measuring laypeople’s trust in experts in a digital age: The Muenster Epistemic Trustworthiness Inventory (METI). *PLoS One*, 10(10), e0139309.
- Intemann, K. (2023). Science communication and public trust in science. *Interdisciplinary Science Reviews*, 48(2), 350–365. <https://doi.org/10.1080/03080188.2022.2152244>
- Irwin, A., & Michael, M. (2003). *Science, social theory and public knowledge*. Open University Press.
- Jensen, J. D. (2008). Scientific uncertainty in news coverage of cancer research: Effects of hedging on scientists’ and journalists’ credibility. *Human Communication Research*, 34(3), 347–369.
- Kim, H.-S. (2007). PEP/IS: A new model of communicative effectiveness of science. *Science Communication*, 28(3), 287–313. <https://doi.org/10.1177/1075547006298645>

- Lewenstein, B. (2003). Models of public communication of science and technology. *Public Understanding of Science*, 96(3), 288–293.
- Mayer, R. C., Davis, J. H., & Schoorman, F. D. (1995). An integrative model of organizational trust. *Academy of Management Review*, 20(3), 709–717.
- Mihelj, S., Kondor, K., & Štětka, V. (2022). Establishing trust in experts during a crisis: Expert trustworthiness and media use during the Covid-19 pandemic. *Science Communication*, 44(3), 292–319.
- Miller, J. (2004). Public understanding of, and attitudes toward, scientific research: What we know and what we need to know. *Public Understanding of Science*, 13(3), 273–294. <https://doi.org/10.1177/0963662504044908>
- Navalhas, I. (2023). *Comunicar ciência e tecnologia: Os livros de divulgação científica da Editora Gradiva no ensino superior*. Edições Colibri.
- Ojala, M. (2021). To trust or not to trust? Young people's trust in climate change science and implications for climate change engagement. *Children's Geographies*, 19(3), 284–290. <https://doi.org/10.1080/14733285.2020.1822516>
- Peters, H. P., & Dunwoody, S. (2016). Scientific uncertainty in media content: Introduction to this special issue. *Public Understanding of Science*, 25(8), 893–908.
- Retzbach, J., Otto, L., & Maier, M. (2016). Measuring the perceived uncertainty of scientific evidence and its relationship to engagement with science. *Public Understanding of Science*, 25(6), 638–655.
- Royal Society. (1985). *The public understanding of science*.
- Schäfer, M. S. (2016). Mediated trust in science: Concept, measurement and perspectives for the 'science of science communication.' *Journal of Science Communication*, 15(05), C02.
- Schiele, B. (Ed.). (1994). *When science becomes culture—World survey of scientific culture*. University of Ottawa Press.
- Steijaert, M. J., Schaap, G., & Riet, J. V. (2021). Two-sided science: Communicating scientific uncertainty increases trust in scientists and donation intention by decreasing attribution of communicator bias. *Communications*, 46(2), 297–316. <https://doi.org/10.1515/commun-2019-0123>
- Tashakkori, A., & Teddlie, C. (2009). *Mixed methods in social & behavioral research*. Sage.
- Weingart, P., & Guenther, L. (2016). Science communication and the issue of trust. *Journal of Science Communication*, 15(5), 1–11.
- Wynne, B. (1992). Misunderstood misunderstanding: Social identities and public uptake of science. *Public Understanding of Science*, 1(3), 281–304. <https://doi.org/10.1088/0963-6625/1/3/004>

Wynne, B. (1998). May the sheep safely graze? A reflexive view of the expert/lay knowledge divide. In S. Lash, B. Szerszynski, & B. Wynne (Eds.), *Risk, environment and modernity* (pp. 44–83). Sage. <https://doi.org/10.4135/9781446221983>

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