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Science Communication of Research Laboratories of the University of Latvia in the Field of Physics

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Abstract. Applying science communication models, the activities of scientists in the physics research laboratories at the University of Latvia covering the period from April 2023 to May 2024 were analysed. The author aims to understand how scientists communicate science to the public and through which models this communication occurs. Research methods included analysis of "European Researchers' Night 2023" event, project reports, surveys of scientists regarding their involvement and attitudes towards science communication, and semi-structured interviews with department and laboratory heads. Findings indicate that scientists prefer collaborative science communication efforts involving scientists and communication specialists. The "European Researchers' Night" is the most favoured platform for public engagement. However, barriers such as time constraints, lack of knowledge, insufficient financial resources, and limited specialist support contribute to scientists' minimal or passive participation in science communication activities.

Keywords: science communication, communication models, University of Latvia, physicists, European Researchers' Night

Introduction

Science communication serves multiple purposes, but its primary goal is to foster an informed society that appreciates the value of science and its contributions to human knowledge, health, and well-being, while also being capable of engaging constructively in debates and decision-making on science and technology issues. By design, science communication encompasses any event or activity where scientific ideas, methods, knowledge, and research results are shared in a clear and accessible manner with audiences who are not experts in the field. These audiences do not need to possess prior knowledge of the institution's focus or science and technology in general. Since there are no strict

guidelines on how science communication should be carried out, institutions and scientists are free to choose their preferred methods of engagement.

Communicating science to non-specialist audiences is an essential aspect of scientific work. It is often a mandatory component of projects funded by organizations like the European Union and the Latvian Council of Science. Knowledge and technology transfer is also vital for society, as entrepreneurs and other users can leverage scientific findings to create high-value innovative products and services. While understanding the target audience and addressing its needs is crucial, effective science communication cannot be achieved without the involvement of scientists themselves, who generate the knowledge and information. However, one challenge lies in the fact that scientists, who are experts in their respective fields (such as physics), are not necessarily communication experts, and science communication may not be a priority in their daily work.

Additionally, there is no standardized approach to evaluating the effectiveness of science communication activities. While the achievements of scientists can often be measured through numerical indicators, such as the number and extent of activities conducted, assessing the quality of science communication remains difficult. This raises an important question: are scientists motivated to engage in high-quality science communication activities, given that the quality of this work is not rigorously assessed and considering the profusion of other tasks that often take precedence in their professional responsibilities? The aim of this study is to analyse the science communication activities of scientists in the physics research laboratories at the University of Latvia. To enable both qualitative and quantitative assessment of these practices, the study focuses on science communication activities conducted over a one-year period, from May 2023 to April 2024. The research addresses several key questions: (1) What motivates scientists to engage in science communication; (2) What models of science communication and communication channels are selected, and what are the reasons behind these choices; (3) Do scientists perceive the outcomes of science communication as important to their work?

Methodology

The methodology for this study was designed to gather information directly from scientists regarding their practices and attitudes, and to compare these insights with the actual activities they performed, thus minimizing subjectivity. The evaluation of science communication activities was guided by established science communication models: Knowledge Deficit model, Dialogue model or Public engagement, and Participation model or Citizen science (Hetland 2014).

To assess these activities, an analysis of the "European Researchers' Night 2023" programme published by the University of Latvia was conducted. Following the selection of physics-related activities, a total of 39 events were examined. Additionally, anonymous reports on science communication, provided by the Latvian Council of Science within the framework of the Fundamental and Applied Research Programme, were reviewed. After filtering to obtain the projects related to physics and the University of Latvia, 12 projects were included in the analysis. In total, content analysis was performed on 92 science communication activities.

To further explore scientists' attitudes toward science communication, an anonymous online survey was conducted, gathering responses from 56 scientists at the University of Latvia engaged in physics research. Additional qualitative data were collected through five in-depth semi-structured interviews with senior scientists – individuals holding doctoral degrees in physics or engineering – who had held current or past leadership roles at the project, group, department, or laboratory level. These senior scientists were chosen due to their responsibilities for coordinating and overseeing science communication activities according to their job descriptions.

Results

In Latvia, various public events offer scientists opportunities and platforms to engage in science communication activities. Notable examples include national events such as the "European Researchers' Night" and the "Physics Festival". Collaboration with journalists also enables the creation of articles or podcasts for specialized publications, further extending the reach of science communication. Additionally, social media platforms, such as *Facebook*, serve as valuable tools for scientists to communicate with the public and share scientific insights.

1. Involvement of University of Latvia physics scientists in the "European Researchers' Night 2023" event

For all activities, the intended themes were clearly identifiable; however, in some cases, there was difficulty in determining the specific planned activities. It is likely that scientists were not focused on the audience when preparing the descriptions of the activities. The analysis of the event programme based on science communication models revealed the following distribution: the Knowledge Deficit model and the Dialogue model, or a combination of both, were utilized in 75% of the activities. This distribution aligns well with findings reported in the literature, which indicate that the Participation model is employed less frequently compared to other science communication models (Metcalfe 2019).

2. Science communications in projects

The project reports provided information about all the publicity activities, hence, the current research required separating the science communication section. In addition, information was provided about the planned measures, i.e. it was possible to compare the plans and the completed work. According to the information obtained, it can be concluded that the scientists do not distinguish what is science communication or dissemination of results, because the reports gathered all possible information about the activities performed during the project.

Of all the planned science communication activities, three can be singled out that were mentioned most frequently: (1) an article in a popular science magazine or a magazine for a wider audience; (2) a publication on social media (without specifying what exactly is planned to be published) or on the website of the project/institution; and (3) participation in the annual "European Researchers' Night" event. Half of the proposed activities aimed to participate in the "European Researchers' Night" and publish content on the institution's website. The analysis of these activities by using science communication models revealed that the majority, specifically four out of seven (57%), fell under the Knowledge Deficit model. This model was predominantly associated with activities such as publications, articles, and radio segments.

Comparison of the planned activities with those carried out suggests that the original application plans are not being fully followed. While common activities, such as participation in the "European Researchers' Night" event and publishing content on project or institutional websites and social media, are consistently carried out, while more specific activities – like interviews on radio or television – are often not announced in advance but are instead performed on an *ad hoc* basis. This trend may indicate that scientists are reluctant to commit to activities they are not confident in executing. It could also suggest a lack of strategic communication plan during the project preparation phase, leading to a more spontaneous approach to science communication.

An analysis of the science communication activities implemented during the projects revealed that most scientists participated in the "European Researchers' Night" event. However, only half of the projects utilized digital communication channels to share their work. Social media, despite being one of the easiest and most accessible ways to reach a wider audience, was not a popular choice among scientists for communicating their research.

3. The survey of scientists' attitudes towards science communication

The survey included scientists of various levels, ranging from laboratory assistants to leading researchers, and from undergraduate students to doctoral degree

holders. The gender distribution among participants was relatively balanced, with a male-to-female ratio of 55% to 45%, in ages from 20 to 80.

More than 80% of survey respondents consider science communication activities to be an important aspect of the research process. Additionally, there is a near-universal agreement (95%) on the need to understand the target audience and adapt materials for each science communication activity. However, fewer than 30% of scientists expressed willingness to organize these activities themselves. A significant reason cited for this reluctance is the substantial amount of working time that science communication activities require, which poses a challenge for many researchers.

According to scientists, the "European Researchers' Night" is considered the most suitable for science communication, which aligns with project report data indicating it as the most frequently implemented activity. In contrast, informational materials on the scientific project's website were viewed as the least suitable for science communication. However, it is important to note that this activity was the most planned according to the project reports. The response to the question of who should carry out science communication was nearly unanimous. In 93% of cases, respondents indicated that science communication should be a collaborative effort between scientists and communication specialists. Meanwhile, 5% felt it should be handled solely by communication specialists, and only one scientist believed that scientists alone should be responsible for this activity. The summary of the science communication activities performed or visited places within the one-year period from May 2023 to April 2024 is presented in Figure 1.

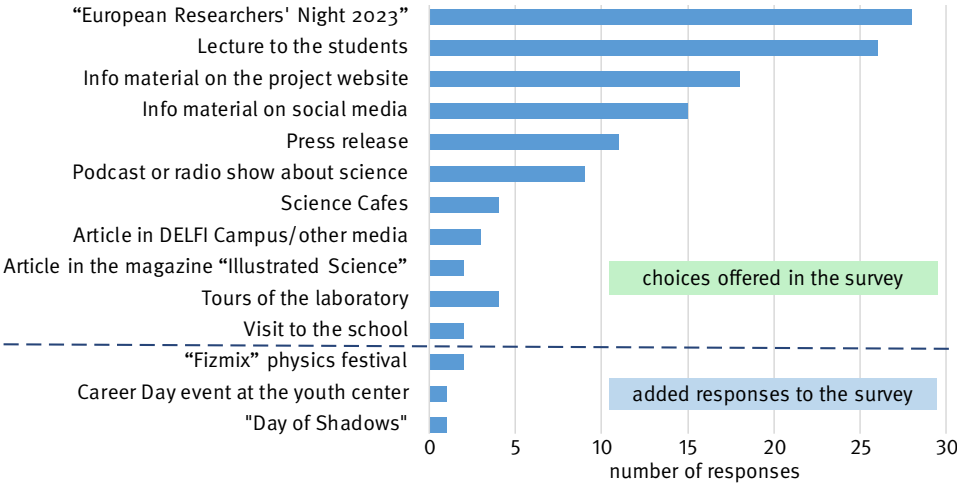

Figure 1. Summary of science communication activities performed, or venues visited between May 2023 and April 2024, based on survey results

All the conducted activities, aside from the "European Researchers' Night", adhered to the Knowledge Deficit or Dialogue models of science communication. For instance, none of the respondents reported involvement in consulting for students' scientific research projects – a type of activity aligned with the Participation model. This discrepancy suggests that scientists may not have a clear understanding of what constitutes science communication and what falls outside its scope. Scientists indicated that, in their opinion, publications on project or institution websites, social networks, and press releases were less suitable for science communication. However, in practice, these channels were used more frequently than more interactive formats like Science Cafés and radio/TV interviews. This preference aligns with the findings reflected in the scientific literature, which suggest that even when researchers recognize the importance of science communication, they often opt for approaches consistent with the Knowledge Deficit or Dialogue models rather than Participation model (Nerghes *et al.* 2022). There is limited evidence in the literature to suggest that theoretical techniques and knowledge about science communication models, as well as best communication practices, are effectively implemented in practice (Judd *et al.* 2021). Several factors contributing to the challenges of science communication have been identified. When summarizing responses to the question about problems and challenges in their working groups, 76% of scientists cited a lack of time as a significant issue, 25% mentioned a lack of interest, and only 10% pointed to a lack of knowledge as a problem. Other notable challenges included the substantial emotional and mental effort required to participate in these activities, as well as the limited or superficial interest from the target audience.

Scientists generally attribute their passivity in science communication to several factors: lack of time, knowledge, financial resources, and specialist support. Additionally, they note that the University of Latvia lacks a unified approach with clear goals and support for science communication. Respondents emphasized the need for scientists to improve their communication skills, as this would benefit both their own work and the public's understanding of the importance of research. It was also mentioned that science communication is sometimes not regarded as a formal work obligation but rather as a voluntary initiative, with group leaders not always valuing participation in such activities. As a result, science communication efforts often lack alignment with specific goals, are conducted sporadically, lack motivation, and are performed mainly to fulfil numerical targets or reporting requirements.

During semi-structured interviews with department and laboratory heads, the scientists demonstrated a deeper understanding of the goals of science communication, recognizing the need to popularize their research results and maintain visibility with the public. They emphasized that each science

communication activity they undertake has a clear, specific purpose. These findings align well with broader research which suggests that the scientists who face pressure to compete for grants and funding tend to use science communication more strategically, as a tool to enhance their visibility and promote their work to a wider audience (Kessler *et al.* 2022).

Conclusions

In their practice of science communication, scientists utilize nearly all available communication channels. They actively participate in events like the "European Researchers' Night", share information on social media through both personal and institutional profiles, post updates on projects or institutional websites, and engage local media. Additionally, many scientists are willing to participate in radio and television programs to discuss scientific achievements.

The "European Researchers' Night" is the most popular platform for science communication, as confirmed by both survey responses and project reports. Beyond this, scientists frequently use social media posts and project or institution websites for communication purposes. The activities at the "European Researchers' Night 2023" included all major science communication models – the Knowledge Deficit, Dialogue, and Participation models – though there was a noticeable emphasis on the Knowledge Deficit model.

When engaging in science communication, scientists seek to feel valued, involved, and respected by society, while also expecting recognition from their peers and leadership. However, factors such as lack of time, knowledge, financial resources, and specialist support often lead to passive participation or non-participation. Additionally, the absence of university's cohesive science communication strategy with clear goals and support exacerbates this issue. It is not necessary for all scientists to engage in science communication, but it is crucial for group leaders to find a balance between quality and quantity by involving those scientists who are skilled in communication, understand its goals, and are motivated to participate.

The research also identified two distinct groups of scientists: those who do not consider science communication as part of their job responsibilities and only engage in it to meet numerical requirements or avoid it entirely, and those who are genuinely interested in educating the public through science communication. Furthermore, a strategic group of scientists views science communication as an opportunity to attract new talent, promote their work, and build partnerships.

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REFERENCES

Hetland, P. Models in science communication policy. Formatting Public Engagement and Expertise. *NJSTS*, 2014, 2(2), 5–17. DOI: https://doi.org/10.5324/njsts.v2i2.2144

Judd, K., McKinnon, M. (2021). A Systematic Map of Inclusion, Equity and Diversity in Science Communication Research: Do We Practice What We Preach? *Frontiers in Communication*, 6, 744365, 1–17. DOI: https://doi.org/10.3389/fcomm.2021.744365

Kessler, S. H., Schäfer, M. S., Johann, D., Rauhut, H. (2022). Mapping Mental Models of Science Communication: How Academics in Germany, Austria and Switzerland Understand and Practice Science Communication. *Public Understanding of Science*, 31(6), 711–731. DOI: https://doi.org/10.1177/09636625211065743

Metcalfe, J. (2019). Comparing Science Communication Theory with Practice: An Assessment and Critique using Australian Data. *Public Understanding of Science*, 28(4), 382–400. DOI: https://doi.org/10.1177/0963662518821022

Nerghes, A., Mulder, B., Lee, J.-S. (2022). Dissemination or Participation? Exploring Scientists' Definitions and Science Communication Goals in the Netherlands. *PLoS ONE*, 17(12), e0277677, 1–29. DOI: https://doi.org/10.1371/journal.pone.0277677