BRIDGING ACADEMIA AND SOCIETY: INSIGHTS FOR CITIZEN SCIENCE AND INNOVATIVE PHD PROGRAM DESIGN

Maria Potes Barbas[1], Andreia Teles Vieira[1], Paulo Duarte Branco[1], & Maria Paula Pinto[2]
[1]CIAC - PLDIS, IPSantarém (Portugal)
[2]CIEQV, IPSantarém (Portugal)

Abstract

The principal objective of this study is to collate comprehensive insights from a diverse range of professional sectors, including academia, business, government, and civil society. This will enable the identification of critical themes and priorities that should inform future research initiatives. To this end, a structured questionnaire was developed as the principal instrument for data collection, crafted with great care to ensure a comprehensive understanding of the diverse perspectives of stakeholders. The questionnaire is composed of four sections. The first section provides general information about the survey, the second section gathers respondent sociodemographic data, the third section explores views on citizen science, and the final section solicits input on doctoral programs. A key focus of the study is on the public's and professionals' perceptions of citizen science, particularly its role in fostering collaboration between researchers and communities and its potential integration into doctoral curricula. The study thus seeks to gain a deeper understanding of these perspectives to identify the opportunities and challenges involved in aligning research priorities with the real-world needs of civil society. This focus is driven by the recognition that citizen science represents an important mechanism for democratizing knowledge production and addressing complex societal challenges through participatory research. The findings from this investigation will directly inform the ongoing collaborative effort to design a PhD program in Digital Communication, an initiative spearheaded by the University of Algarve and Santarém Polytechnic University. The program is envisioned as a multidisciplinary and innovative academic offering that incorporates both academic and non-academic dimensions. By soliciting feedback on the program's title, objectives, structure, and research priorities, the study guarantees that its design will align with the requirements of a diverse range of stakeholders and respond to the demands of a rapidly evolving digital communication landscape. The study's broader impact can be seen in its potential to shape a new paradigm in doctoral education, one that prioritizes inclusivity, innovation, and societal relevance. The program aims to equip future researchers and professionals with the requisite skills and knowledge to address pressing issues in digital communication while fostering collaborative engagement with non-academic sectors through the incorporation of feedback from diverse respondents. In conclusion, the study contributes to the advancement of digital communication as a discipline, with the dual aim of strengthening academic rigor and enhancing the capacity of research to drive meaningful societal change.

Keywords: Societal impact of research, citizen science, academic-non-academic collaboration, collaborative education.

1. Introduction

In an era marked by complex societal challenges that require interdisciplinary solutions, the relationship between science and society is undergoing a significant transformation (Bruneel et al., 2010). This paper explores the potential of citizen science and innovative PhD programs to serve as channels for aligning academic research with societal needs. By integrating participatory research methodologies and fostering cross-sector collaboration, educational institutions can enhance their societal impact while equipping doctoral students with a range of competencies relevant to a rapidly evolving global landscape context (Longmore et al., 2018; Barber, 2014).

As societal challenges become increasingly intricate, the role of academia in producing socially relevant knowledge has become more significant. Citizen science, which involves the public in scientific inquiry, is a promising approach to bridging the gap between research and society (Hitchcock et al., 2021). Incorporating citizen science methodologies into doctoral education can help universities democratize

knowledge production, enhance research impact, and foster interdisciplinary collaboration. This paper presents an analysis of stakeholder perspectives on citizen science and doctoral education, with a particular focus on a proposed PhD program in Digital Communication (Gantogtokh et al., 2017). The objective of the present study is to identify the key themes and priorities that should guide the development of the program to ensure its alignment with contemporary academic, industry, and societal needs. Specifically, the study addresses the following questions:

- o What are the perceptions of academia, industry, government, and civil society regarding citizen science and its potential within doctoral education?
- o What expectations do these stakeholders have for a PhD program in Digital Communication, particularly concerning curriculum design, research priorities, and skills development?
- o How can citizen science methodologies be effectively integrated into a PhD program in Digital Communication to enhance its societal impact and relevance?

2. Design

The design of this study employs a mixed-methods approach, integrating qualitative and quantitative insights derived from a structured questionnaire. The survey was meticulously designed to elicit demographic information, perceptions of citizen science, and expectations for a PhD program in Digital Communication. Thematic analysis was employed to identify salient patterns and stakeholder priorities. This approach ensures a comprehensive understanding of how citizen science can be integrated into doctoral education while aligning academic research with societal needs.

2.1. Methodology

The data for this study were collected through the administration of a structured questionnaire to professionals from academia, industry, government, and civil society. The questionnaire explored respondent demographics, perceptions of citizen science, expectations for doctoral education, and recommendations for curriculum design. The responses were analyzed thematically to identify patterns and insights that inform the structure and objectives of the proposed PhD program.

A purposive sampling strategy was employed to select participants with relevant expertise and experience in citizen science, digital communication, and doctoral education. Potential participants were identified through professional networks, online databases, and recommendations from experts in the field. The questionnaire was administered online using a secure platform to ensure data privacy and confidentiality. Participants were provided with a clear explanation of the study's purpose and were informed of their right to withdraw from the study at any time.

The data analysis process involved a combination of descriptive statistics and thematic analysis. Descriptive statistics were used to summarize the demographic characteristics of the participants and their responses to the quantitative questions in the questionnaire. Thematic analysis was used to identify recurring themes and patterns in the qualitative responses to the open-ended questions. The thematic analysis process involved several stages, including data familiarization, code development, theme identification, and theme refinement. The themes were then organized into a coherent framework that captured the key insights and priorities of the stakeholders.

2.2. Objectives

The present study has been designed to achieve several key objectives. Firstly, it seeks to examine the role of citizen science in doctoral education by assessing its potential to bridge academia and society. Secondly, it aims to identify the perceptions and expectations of relevant stakeholders—including academia, industry, government, and civil society—regarding the integration of citizen science into a PhD program in Digital Communication.

The study also proposes a structured and interdisciplinary doctoral curriculum that incorporates participatory research methodologies, innovative teaching strategies, and industry collaborations. Finally, it outlines the challenges and opportunities associated with the inclusion of citizen science in doctoral training, offering concrete recommendations to enhance the program's impact and societal relevance.

3. Discussion

The survey participants represent a diverse group in terms of gender, age, and nationality, with the majority residing in Portugal and a smaller proportion holding dual nationality. The majority possess advanced academic qualifications, with the largest segments being PhD and master's degree holders. Additionally, a significant proportion of respondents have professional experience in universities, research institutions, and industry sectors related to digital communication. This diversity provides a broad

perspective on the challenges and opportunities associated with integrating citizen science into doctoral training. The demographic diversity of the sample strengthens the validity and generalizability of the findings, as it captures a wide range of perspectives and experiences.

The integration of citizen science into academic research was a topic that received a high level of support from respondents, who emphasized its potential to enhance collaboration between researchers and the wider community. Many respondents expressed the view that citizen science fosters public engagement, democratizes knowledge, and enriches research through diverse perspectives. However, concerns were raised regarding data reliability, ethical considerations, and the long-term sustainability of citizen involvement. Despite these challenges, there is a broad consensus that citizen science methodologies should be incorporated into doctoral training to equip students with the skills necessary for participatory and community-oriented research. These concerns highlight the need for careful consideration of ethical and methodological issues when integrating citizen science into doctoral research.

The findings indicate strong support for a PhD program focused on Digital Communication, with respondents recognizing its relevance in both academic and professional settings. Participants suggested that the curriculum should include topics such as digital leadership, governance, and marketing, along with interdisciplinary studies that extend beyond traditional communication research. Interactive teaching methodologies, including workshop-based learning, project-driven research, and participatory discussions, were identified as essential for fostering critical thinking and practical application. The inclusion of citizen science components within the program was seen to encourage real-world problem-solving and meaningful community engagement. The emphasis on interdisciplinary studies and interactive teaching methodologies underscores the need for a holistic and experiential approach to doctoral education.

It was asserted by the relevant parties that there is a necessity for robust technological infrastructure to support research and learning in the domain of digital communication. Essential resources in this context include high-performance computing systems, audiovisual recording tools, and digital collaboration platforms. Concerning research priorities, there was strong support for interdisciplinary studies that address digital inclusion, the societal impact of emerging technologies, and the role of communication in fostering democratic participation. These focus areas are considered crucial for ensuring that research remains relevant and responsive to contemporary challenges. The identification of these research priorities reflects the growing recognition of the societal impact of digital communication technologies.

The importance of interdisciplinary studies in addressing issues such as digital inclusion, societal impact, and democratic participation was emphasized by stakeholders. The value of partnerships with the industry in providing practical experience and facilitating knowledge exchange was also recognized. While some institutions expressed willingness to offer external supervision, the availability and structure of such arrangements varied. It was noted that strengthening industry collaborations would be essential in ensuring that doctoral candidates acquire hands-on experience that complements their academic training. The emphasis on industry collaborations highlights the need for universities to forge stronger ties with the private sector.

The integration of citizen science into doctoral education represents an opportunity to bridge the gap between academic research and societal needs. The findings indicate a strong demand for interdisciplinary, practice-oriented, and socially relevant PhD training, and by incorporating participatory research methodologies, fostering industry partnerships, and equipping students with digital communication skills, the proposed PhD program can serve as a model for innovation in doctoral education. However, challenges such as ethical concerns, data validation, and institutional resistance must be addressed to ensure the effective implementation of citizen science within the curriculum. These challenges underscore the need for careful planning and implementation when integrating citizen science into doctoral education.

4. Conclusion

The study emphasizes the significance of formulating a PhD program that is interdisciplinary, participatory, and aligned with real-world challenges. Citizen science emerges as a pivotal mechanism for enhancing research impact and fostering collaboration between academia and society. To ensure the program's success, its curriculum must be meticulously structured to incorporate citizen science methodologies, diversify teaching approaches, and fortify industry partnerships (Kross et al., 2019 & 2021). By addressing these factors, the PhD program in Digital Communication has the potential to set a new standard for doctoral education, balancing academic rigor with societal relevance.

5. Recommendations

Based on the analysis, this paper proposes several recommendations for the development of the PhD program. First, the establishment of structured guidelines to facilitate the integration of citizen science into doctoral research is recommended. Second, the diversification of teaching methodologies to include interactive, practice-based learning approaches is recommended. Thirdly, the establishment of stronger industry collaborations is recommended to provide students with real-world research opportunities. Finally, the development of ethical frameworks is suggested as a means of guiding citizen science initiatives within the PhD curriculum. The implementation of these measures will ensure that the program effectively prepares future researchers and professionals to address the evolving challenges of digital communication.

References

Barber J. D., (2014). Integration of learning model: How college students integrate learning. *New Directions for Higher Education, 165*, 7-17. doi:10.1002/he.20079

Bruneel, J., D'Este, P., & Salter, A. (2010). Investigating the factors that diminish the barriers to university–industry collaboration. *Research Policy, 39*(7), 858-868.

Gantogtokh, O., & Quinlan, K. (2017). Challenges of designing interdisciplinary postgraduate curricula: case studies of interdisciplinary master's programs at a research-intensive UK university. *Teaching in Higher Education, 22*, 569-586. 10.1080/13562517.2016.1273211

González-Salamanca, J. C., Agudelo, O. L., & Salinas, J. (2020). Key Competences, Education for Sustainable Development and Strategies for the Development of 21st Century Skills. A Systematic Literature Review. *Sustainability*, *12*(24), 10366. https://doi.org/10.3390/su122410366

Hitchcock, C., Vance-Chalcraft, H., & Aristeidou, M. (2021). Citizen Science in Higher Education. *Citizen Science: Theory and Practice*, *6*(1), 22. https://doi.org/10.5334/cstp.467

Kross, S., & Guo, P. (2021). Orienting, framing, bridging, magic, and counseling: How data scientists navigate the outer loop of client collaborations in industry and academia. *Proceedings of the ACM on Human-Computer Interaction, 5*(CSCW2), Article 311, 1-28. https://doi.org/10.1145/3476052

Kross, S., Peng, R. D., Caffo, B. S., Gooding, I., & Leek, J. T. (2019). The democratization of data science education. *The American Statistician, 74*(1), 1-7. https://doi.org/10.1080/00031305.2019.1668849

Longmore, A.-L., Grant, G., & Golnaraghi, G. (2018). Closing the 21st-Century Knowledge Gap: Reconceptualizing Teaching and Learning to Transform Business Education. *Journal of Transformative Education, 16*(3), 197-219. https://doi.org/10.1177/1541344617738514