

39. Analysis of Doctoral Research in Science Communication

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Abstract. In this paper we will present a review of over 57 PhD theses on science communication, from 2000-2010, coming from all over the world. From this analysis we reflect on the development of science communication as a scientific domain. The review shows that media relations with science and the means of science communication are the most researched topics. More fundamental theoretical studies or reflections on science communication are much less to be found among PhD-theses. In this paper we discuss this 'rhetorical opportunity' for reflective science communication and we discuss how PhD research might contribute to deeper theoretical development of science communication.

Keywords: Theoretical development, PhD research review, Rhetorical opportunity, Reflective discipline,
Science communication graduate school

Introduction

PhD research is normally recognized as the cutting edge research in a domain. So an overview of theses in a domain might say something about the state of the art in a field from a theoretical perspective. This perspective is important to know since a core of a field describes its rhetorical opportunity (Seydel, 2007): what are the intellectual sources? What is the academic tradition in which the research is carried out? What has science communication to tell based on these sources and traditions to socio-cultural problems.

This question does not stand alone. In the September 2010 issue of the Journal of Science Communication established researchers in the field were asked to reflect on the status of science communication from the point of view of a discipline and a field of study. Pitrelli (2010) asked: What topics should science communication focus on and why? What is the real degree of autonomy from other disciplines? Bell(2010) admitted: if I'm honest, I'm not entirely convinced science communication really exists. But other authors pleaded for further theoretical development (Trench and Bucchi, 2010). They stated that the following conditions should be recognized to be a discipline: (1) a bounded field of study; (2) shared interests, terms and concepts; (3) significant presence in teaching and research in the higher education sector; (4) international research; (5) specialist scholarly publishing; (6) organized communities or networks of scholars; (7) a body of theoretical work that underpins empirical study. In their contribution to this special issue they concentrated on the first and the last point. They stated that science communication is a defined field of study and has grown over the last 20-30 years in the intersections between disciplines such as science education, social studies of science, mass communication and museology. It developed, as Trench and Bucchi describe, as a field of formal study only after it was a named practice with associated training and education programs. So science communication is a field based on various disciplines strongly attached to a practice. From our current analysis of a decade of science communication theses we may obtain insights which are helpful to the other issues raised by Trench and Bucchi as well.

Gascoigne et al (2010), also in this special issue, defined science communication as a field of study based on: 1) the presence of a community; 2) a history of inquiry; 3) a mode of inquiry; 4) the existence of a communications network. They concluded that the technical requirements for being able to claim that a field of research has achieved the status of a discipline, is not clear. Here too this theses review may fill some of the gap Gascoigne et al encounter?

The final contributor to the Journal of Science Communication discussion, Hornig Priest (2010), wonders what it entails to be an academic discipline. She writes that a academic discipline involves attempts to understand, influence, improve and critique the processes of science communication, including attempts to grasp their broader social, political and philosophical significance and dynamics, alongside their immediate impact on individuals and

groups. Again, in the case of this paper it might be possible to obtain some of the answers to what Hornig Priest asks, e.g. do the theses critique the existing processes of science communication?

Moreover, Hornig Priest asks herself if there is a need to become a discipline. Some of the interdisciplinary disciplines still stay a subdiscipline. This might be the case for science communication as well. However, she believes that the unique interwoven contributions of subdisciplines are at the core of what gives science communication the potential to continue its emergence as a true interdisciplinary subdiscipline and not just a set of activities or practices or a list of interesting subjects.

From the sub-disciplines as Mulder et al (2009) state, science communication can be considered as an emergent domain, with its own specific multi-disciplinary dynamics. This is, as we will show in this paper, stated by the overall view obtained from a decade of science communication theses. And, as Hornig Priest says, in line with Trench and Bucchi, this is very important, since otherwise the science communication domain would risk being defined merely as the 'outreach' departments of the institutions that produce new knowledge. The latter is indeed happening with the vast European Union projects in which the science communication part is mostly 'reduced' to events and some kind of evaluation. Science communication should be part / integrated in the research process itself and should be researched as such (Van Der Sanden and Osseweijer, in press). PhD research should be the very cutting edge of developments in science communication. Is it possible to fill in or support all the above from a decade of theses? Is there an emergent field of science communication to be discovered? We also asked ourselves how science communication PhD research could be enhanced from an international perspective.

Collection of Data

We collected information on 57 theses world-wide and categorized these theses according to the criteria, major research theme, research aim, research question, research subject, theories / theoretical framework used, mentioned practical implication and kind of research. All respondents sent an abstract and 70% of them also sent a summary. In most cases we received full information in English but some of the theses are in other languages and we had only English translations of the abstracts. However, we believe that this collection of thesis information does give an adequate representation of the issues stated above. Of course, we keep in mind that reviewing the theses will generate a new set of criteria.

Results

In outline numbers we can describe our sample as follows:

Total is: 57

Countries: Ireland, UK, Australia and USA (34); Italy, Netherlands, Austria, Germany, Belgium and Spain (17); Korea, Brasil, Colombia and Japan (6).

Subject: science (19); medicine (15); environment (6); genetics (6) humanities (5); social studies of science like (6);

Research theme: media and journalism (14); means of communication (10); engagement and dialogue (7); scientists' role and image (7); roles of stakeholders (6); evaluation (1); various (12).

Methodology: media-analysis, surveys, interviews and case studies are by far the most popular. Research aims. It is not possible to identify unifying research aims. For example, in the media and journalism theses the stated research aims include:

- analysis of newspaper content and observations and in-depth interviews with Ontario journalists from a variety of print and broadcast media outlets, in rural suburban and urban areas;
- investigates the extent to which a particular group of the public (18-25 years), Northern Ireland, interact with science and the media and what effects it has on their actions, knowledge and understanding of science;
- examines how four contemporary British scientists and popular science writers are portrayed as mass media celebrities;
- examination of representation of science education in UK newspapers and focuses on the role of the expert sources in a controversy about the teaching of creationism alongside the theory of evolution in the science class rooms;
- examines factors shaping journalistic coverage of risk debate involving new technologies;
- explores the role of the press in the process of consolidating the genetic approach to human biology and disease in the Spanish context;

- analyze the relationship between obesity and poverty in Brazilian daily newspapers.

Theories used

Too many to mention here, but these include: health belief model; elaboration likelihood model; self categorization theory; Pierce's semiotic logic; self-transcendence and self-enhancement; framing; theory of planned behaviour; Philipsen's speech codes theory.

Contribution to domain or practical field

These include:

- the evidence points to of the importance of understanding expertise not only in individual but also in collective terms. Overall, the thesis demonstrates a more complex conceptualization of expertise;
- the thesis argues that universities therefore need to take the responsibility for this in the same way as they are responsible for academic training and research;
- the results have implications for the way in which research institutes incorporate their accountability responsibilities into the organisation's culture;
- the study shows the stability of the normative structure of science.

Conclusion

From the results above we may conclude that: (1) the Anglo-Saxon world is most active in research in this field; (2) hard sciences like medicine and natural science are the most researched subjects of science; (3) media and science journalism are well researched; (4) that there is no identifiable common core of knowledge within those themes or research; (5) there is no identifiable common aim in contributing to the domain or the practical field. It is also difficult to see evidence of the development of: (1) a recognizable theoretical framework; (2) a network or community of researchers; (3) a shared mode of inquiry, interests and concepts and practices.

So from the theses it is only possible to draw some conclusions on the emergent or meta level. We can see, as Trench and Bucchi (2010) describe, a field of formal study in which PhD theses critique the processes of science communication based on various disciplines such as psychology, communication studies, social studies of science. We can also see that all the domains Mulder et al (2008) mention are incorporated in this collection of PhD theses. But none of the theses we have information on critiques the supporting disciplines themselves and there are no theses found so far outside of these discipline boundaries that reflect on science communication. This means that science communication research is broadly in line with where it all started: science and its (needed) societal impact.

Discussion

Is there a clear rhetorical opportunity within these meta boundaries? Science communication makes science tangible by reflection, analysis and synthesis. It is made - tangible through its distinct parts becoming visible in the media and in science communication strategies. The possibilities and impossibilities of science in its societal function become visible through communication.

As it is stated by some of the theses reviewed, when a researcher has a clearer vision of science and its societal impact by means of science communication, the practice of actually doing research is understood much better. Science communication is much more 'science' than 'communication'. However, once you know what to communicate by using communication theories, you know how to communicate. But this communication process itself again is more about science and its impact on its target audiences. With regard to the question of science communication as a discipline the outline of the reviewed theses and the reflection on it might show that we need to think in a reversed mode and conclude that we are a sub-discipline of social studies of science making use of the theories and methodologies of communication to reflect on science and its social importance and interaction. We understand the social studies of science from a communication perspective. Science communication needs to critically engage with communication theories if it is to be recognised as a communication discipline.

This requires much deeper investigation, including analysis of how this PhD research contributes to the theoretical development of the research groups from which it comes. This is a topic that might be part of the agenda for an international gathering of PhD researchers in an international PCST-Graduate School (virtual or physical, or both) that would promote profound thinking on science communication, its starting points and practical implications on the practice of science.

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