This preprint copy is an accepted manuscript of the chapter published in Orthia, L and Robertson, T (eds),. (2023) *Queering Science Communication*, BUP

Please cite as:

Lock, S. J., & Armstrong, E. S. (2023). The Possibilities of Queer in Science Communication Teaching and Pedagogies. In *Queering Science Communication,* Orthia, L and Robertson, T (eds), Bristol University Press. pp. 181-190.

The possibilities of queer in science communication teaching and pedagogies

Simon J. Lock, University College London & Eleanor S. Armstrong, Stockholm University

Pedagogy in science communication can be wide ranging, spanning formal education, informal education, everyday science learning, and professional development contexts. So how might we apply the concept of queer pedagogy to these multiple processes and settings? To paraphrase Luhmann (1998), what would a queer pedagogy of science communication (QSCP) look like? What would be its ambitions, and where would it take place? Is QSCP something just for queer science communicators and students? Or would the practice also include queering the science communication curriculum? Or, is it about queer learning, teaching and practices within the broad umbrella of science communication? In this chapter we approach all these questions and explore what queer theory might bring to science communication and the possiblities of teaching it queerly.

Radical pedagogies (hooks 2003; Freire, 2018; Giroux 2020) and queer theories have served as forms of critical or subversive interventions in both oppressive classroom relations and social architectures of heteronormative sexualities and genders for a long time now. Pedagogy is often understood as referring to the "how-to" of teaching. yet more recently, as Luhmann notes, 'flagged by signifiers such as *feminist, radical,* and *anti-racist,'* pedagogy is now 'highly critical of mainstream education and of its tendency to reproduce racial, gendered, and class-based power relations in its institutions, ideologies, and practices.' (Luhmann, 1998 p. 125). Common to these radial pedagogical approaches is the desire to intervene in the reproduction of power dynamics and to create more inclusive learning environments through the transformation of

curricula and the structures of social interactions within classrooms. In using queer here we draw on the distinctions made by Morris (1998) between the use of queer as a subject position and queer as a politic, which do not always necessarily overlap. While queer theory emerged from the study of, and viewpoints of, people who are considered outsiders in terms of sexual and gender identities, it has also been used to interrogate all claims of 'normalcy' and the processes by which these are defined and policed (Greene 1996; Morris, 1998; Shlasko 2005). If, as Britzman (1995) suggests, queer pedagogy's goal is the radical practice of deconstructing normalcy, then as Luhman (1998) argues, 'it is obviously not confined to teaching *as, for,* or *about* queer subject(s)' (p. 129). A queer pedagogical agenda, needs to be extended to encompass the refusal of *any* normalization, be it racist, ableist, misogynistic, or any other forms of oppression. Therefore, through an interrogation of the often implicit assumptions and normalcy of heternormativity, queer theory "offers a critique of reigning ideologies of subjectivity, power, and meaning'' (Greene, 1996, p. 326) all things that we argue here are at the heart of science communication but also very much at stake in all communicative encounters.

In planning this chapter we were alive to Luhmann's (1998) concern as to whether a queer pedagogy could resist the desire for authority and stable knowledge; could it resist disseminating new knowledge and new forms of subjection from the position of authority? If the goal of queer pedagogy is to destablise norms and normalcy we felt that attempting to write *the* chapter on this topic would not be in the spirit of either set of theories and approaches. Thus we have approached this chapter in the disruptive spirit of both by posing a series of questions to ourselves and our readers, bringing our own sets of knowledges to bear on them, while fully accepting that these will be limited by our own queer positionalities. Our aim here then, is to model an example of what a QSCP might look like, how it might be experienced and practiced, and to equip our readers with a set of ideas which they can take into their own classrooms, workplaces and practices. Thus, what follows are some questions, each followed by answers and reflections from each author. Lastly, before we entered into this dialogue we felt it important to both be clear with ourselves and our readers what our own positionalities are. SJL uses he/they pronouns and is a queer white British academic in their 40s, they are genderqueer and polyamorous. ESA uses she/her pronouns and is a queer, dyslexic, white British academic (living in the USA at the time of writing) in her 20s.

As Roberson and Orthia (2021) have previously noted there exists an underrepresentation of queer people with in science communication both within the examples used, as subjects within the science that is being communicated, and also within those people teaching and practicing science communication. **How might we ensure greater inclusion of queer people, stories and examples our teaching?**

ESA: There are perhaps three axes that we might think along in pedagogical practices to introduce LGBTQ+/queer issues: who are we talking about? which parts of science are we talking about? and through discussing topics that matter to the community (reformulating Winchester, 2012 for scientific practice). There are a range of organisations around the world that represent queer scientists (e.g. Pride in STEM, 500 Queer Scientists, OutSTEM, Queer Scientists PH) providing useful points of departure for science communicators to independently broaden the 'who' within their discussion of the hegemonic canon of science. Bringing QSCP into the 'who' we represent in science, we can also challenge the norms of who constitutes a scientist - bringing in narratives of non-traditional scientists such as people in manufacturing, laboratory or technical works, or practicing outside the strictures of formal 'science' (for instance, Liboiron, 2021). To challenge ideas about 'what' is being considered; instructive books on queering science studies (e.g. Cipolla et al. 2017) can act as points of departure for thinking about which queer topics of science can be communicated, and how they are framed within the discourses created through science communication.

SJL: QSCP also encourages us to draw attention to issues that are of concern to queer communities (a selection of which are included in this text) - particularly in the communication of medical sciences, and biological sciences where heteronormative bodies and actions are normalised in multiple ways. With better, queerer, representation comes alternatives knowledges, with learning about queer scientists and queer publics hopefully comes the realization of their valuable place within science, and we can move towards less discrimination within STEM (Dyer et al, 2019; Cech & Waidzunas, 2021) but also within wider social values. We might also see this approach as a method for addressing other pedagogical concerns around creating an inclusive classroom that supports queer folk.

ESA: However, the question is predicated on understanding that there are 'correct' 'places' where we should do this inclusion work, and that assimilatory politics is a desirable outcome. In the first case, we can challenge these 'places' where this inclusion happens. Such categories might include critiquing who the 'public' are - rejecting the single, monolithic category and instead closely attending to queer groups of people who constitute less obvious 'publics'. QSCP also develops our thoughts about who counts as a legitimate voice of 'science' to communicators - what heteronormative (and/or homonormative), racialised or ablist assumptions might be at play when selecting individuals to represent science or scientists. Using QSCP directs our attention to what we constitute as 'science' - how do the selections of topics in science to communicate confirm the positions of science as 'objective', 'universal'.

Thus, QSCP illuminates possibilities for learners to think beyond science, and science communication as being something untied to representation.

SJL: Additionally, an assimilatory politics of QSCP is limited. Grounded in a set of assumptions common to older forms of LGBTQ+ politics, assimilatory work assumes that homophobia is little more than a problem of representation, an effect of non-existent or distorted images of lesbians and gays. The job of representation, therefore, is to counter these longstanding representations of lesbians and gays solely as sick, sexually perverted, unhappy, and antisocial with positive representations of LGBTQ+ life. This goal of inclusion within the existing structures and binary-gendered heteronorms risks erasing the diverse trans and non-binary lives and queer identities that dissemble the gender binary, as a result of following a homonornative or assimilationist approach to queer politics (Duggan, 2002). To show queer people as what Ahmed (2010) terms 'happy objects', oriented only toward heteronormative lives, knowledges, and things that make people 'normal' and 'happy' is a limiting approach. Should we, for example, be happy because we have queer science communicators but ignore their promotion of science research sponsored by the military-industrial state, which underpins violence against marginalised groups worldwide? If we agree that science communication is politics then a QSCP must attend to this dimension as well.

Okay, how can QSCP pursue a 'queer as politics' approach as well?

SJL: For me it's a process of being critical of normalisation. As Shlasko (2005) argues a queer theoretical lens can provide a framework through which we can interrogate not only the treatment of queers but also queerness of identity and normalcy. So that means queering science, queering publics and queering science communication and the underpinning assumptions about what it is for. A critical understanding of the public sphere - the context for most science communication - and its entrenched power dynamics and oppressions along the lines of gender (Fraser, 1990), race (Dawson, 2019) and sexuality (Warner, 1993) must be centred. These dynamics structure and affect those with marginalised identities and their ability to speak, listen, participate, and be represented in the context of science communication. We need to talk less about "hard to reach groups" or publics that are "difficult to engage", and start talking about those groups and identities that are often medicalised via science and problematised by science communicators.

ESA: I also don't think that it is a coincidence that these groups are generally the most marginalised groups within society, which again speaks structural inequalities not abject publics.

The onus is on science communicators to do the work and not perpetuate harmful and reductive stereotypes of marginalised publics as having the wrong attitudes or orientations towards science. We can look at the work Prepster (2020), a PrEP[1] activist group in the UK, have done to recognise the needs of queer, black and trans audiences and tailor their outreach in ways that are meaningful to those specific groups rather than blaming them for not responding to existing mainstream health promotions. We might also recognise grassroots science communication in zines on health conditions (see Vigour and Cook, 2018) which centre the lived experience of those living with them, created and produced by people who are experts in their own bodies and experiences. Such items are often able to identify gaps or absences in mainstream advice and support and create networks of care that sit outside of mainstream health interventions.

SJL: Yes - and this speaks to the fact that science, as we communicate it now, has historically been a large part of the production of norms of the body more generally as well as heteronormativity and binarised gendering. Science communication in turn supports and mobilises this scientific authority. For example, the construction of demonstrations (by and to gender-segregated audiences) of British scientists of the enlightenment period, which were later exported around the world, have been framed by the power of colonial imperialism as being *the* legitimate method of presenting science in public. This bleeds into the contemporary understandings of what 'correct' science communication looks like: valuing demonstrations and one-way presentation, for example, over artistic engagement or dialogical and collaborative practices. QSCP can challenge the foundational certainty of how science and science communication should be done, to prioritise non-traditional modes of engagement that are developed by, with and for diverse audiences (Simon, 2016).

So what might this look like in practice?

ESA: Using these ideas during my science communication practice, I've helped audiences ask questions about not just the representation within contemporary scientific studies, but the premises that underpin such studies too. For example, in the Science Museum, the original double helix model of DNA is narrativised as being a way to understand our identities - knowledge of your DNA *is* knowledge of your identity. We looked at research studies that aim to discover 'gay' genes by correlating genetic testing with survey responses from participants - but such studies are never value-netural. Who feels comfortable about going to a laboratory and declaring their sexuality to researchers? How was evidence of one's sexuality defined? How

[1] PrEP (pre-exposure prophylaxis) is medicine people at risk for HIV take to prevent getting HIV.

might queer responses also be shaped by percieved needs to perform ‘good’ or ‘normative’ homosexuality social or cultural expectations by subjects to researchers? Deeper still; why would knowing if there was a biological basis of ‘gayness’ be a good thing? Is ‘gayness’ the same as ‘queerness’, ‘homosexuality’, or ‘bisexuality’? What is (or could be) the intended use of this knowledge? Applying a QSCP helps unpack the norms we perpetuate around what knowledge is legitimate science.

SJL: Underpinning many of these studies is an appeal to the idea that the cultural standard for knowledge is Science (Haraway, 1988); and that understanding any phenomena ‘scientifically’ makes the knowledge automatically more robust, more objective, and thus ‘better’. In news media science communication on studies of sexuality and arousal, for example, where there is poorer agreement between women’s genital measurements and participants self-reported arousal than men, women are framed as deviant: “women defy categorization” (Er-Chua, 2009), there is a “discord, in women, between the body and the mind” such that “with the women, especially the straight women, mind and genitals seemed scarcely to belong to the same person” (Bergner, 2009). A QSCP ‘queer as politics’ approach instructs us to unpack how science communication develops and maintains cultural narratives of women’s sexual problems. While theorists such as Spurgas (2020) have argued that such scientific studies *create* women’s sexual desire as a problem to be solved in science, we must be astude to how science communication perpetuates these into the public sphere. QSCP’s queer as politics also challenges the capacity for communicating this kind of gendered research in the first instance. Sexuality research in science is predicated on fitting people into neat categories of ‘men’ and ‘women’ who are, in turn, attracted also to neat categories of ‘men’ and ‘women’ when being shown videos for research; or when checking boxes on forms about sexual attraction. But when we communicate these ideas, we do not trouble the normative basis of such categories. A QSCP would resist presenting these ideas as neatly resolved to publics, and might instead encourage the learner to challenge the premise of “norms” of gender, attraction, or desire (Hosseini, 2018).

ESA: A QSCP approach that emphasises queer as politics needs to be astude to creating its own norms around queerness too. Fungi, for example, well known to have an incredibly diverse range of sexes, are often used in science communication practices to demonstrate that using the “lens of life’s diversity, we should not be surprised that we humans are variable too” (Rokas, 2018). Thus, in addition to fungi’s queerness for investigating the tensions between social norms and scientific expectations (Kaishian & Djoulakian, 2020), we can use QSCP to unpack how these tensions are mediated to publics in science communication making queerness acceptable because of its occurrence in the natural world. However, critique of acceptability as

a result of “naturalness” in the animal and plant world is vital, as without this dimension of a QSCP, science communication overlooks the cultural constructedness of the category of “natural” in the first instance and its implications (Terry, 1997).

SJL: To queer science communication itself then is to be attentive to it’s role in constructing and perpetuating dominant social norms around gender, race, sexuality and ability. As we teach in our science communication module for undergraduate students, from day one, science communication *is* political, it *is* power. To pretend otherwise is to ignore science’s role in constructing both our ideas about gender, race, sexuality, ability under western capitalist-colonialist societies but also historically justifying these norms directly and indirectly. So let’s question what norms we are upholding through our actions as science communicators? Are we faithful cheerleaders for science or can we be critics? We might see this through the lens of queer politics: are we here to make science more palatable for general consumption, to sell science (an assimilationist approach) or are we here disrupt the status quo? To challenge the heteronormativity of science? To disassemble the role science has played in constructing harmful hierarchies of racial difference? To open up science to wider sets of knowledges? QSCP encourages the learner to reflect on the aims and goals of science communication, rather than simply just the content and methods.

So, beyond these elements, what other norms or binaries might QSCP help us unpack?

SJL: To approach science communication queerly means to be attentive to how, and why, oppositional binaries are constructed. Historically (particularly under a deficit model approach) any teaching of science communication is structured around a series of binaries. At the core of a lot of science communication work is not just a pedagogy of knowledge transfer, but more broadly the removal of ignorance. Thus key binaries that have underpinned almost all science communication are expert/lay, scientist/non-scientist, knowledgeable/ignorant. Many theorists have argued that construction of the ‘one’ creates the need for the oppositional or abject ‘Other’ (e.g. de Beauvoir, Said). Much like the need for heterosexuality to need its abject ‘Other’ in homosexuality, science has through the active promotion of communication, rhetorically constructed - lay-people, pseudo science, other forms of knowledge as ‘Others’ in the pursuit of it’s own epistemic authority, status, or the seeking of resources (Geiryn 1983; Lock, 1998). QSCP asks us to resist these formal binarisations along with other binarizations that are implicit within them or that are underpinned by them and recognise their historical and contemporary fluidity, when setting up science communication educative practices. QSCP might instead invite reflection on the role science communication plays in constructing such binaries and the work this is doing in terms of who has power and who might be being othered or oppressed in the

processes and activities we teach. Who is being excluded by such binaries? Who is made abject in relation to science?

ESA: The other thing to think of is how we construct the binaries that *should* be tackled within science communcation and what is outside of this remit, which in turn cements queer and science as oppositional. A QSCP practice might therefore be aware of default 'relationship' language (family, couples, parent-child, genders) used in communicating with audiences in popular science books; but it could also look at how books that do engage with queer-inclusive language are often positioned as a separate genre to popular science texts. Fuss (2013) argues that absenting a critical analysis of modern divides between homo/heterosexuality leaves our analysis of any cultural practice incomplete.

What tools are to hand for us to develop or implement a QSCP?

ESA: First I think we should return to the fundamental concepts of queer pedagogy *beyond* science communication - as fundamentally way to developing critical learners. Criticality can come in many frames, but importantly we reiterate that queer pedagogy encourages the refusal of any normalization, particularly racist, ableist, misogynistic, and other oppressive regimes of knowledge and catagorisation in the pedagogical space. An intersectional commitment to QSCP is lost without this.

SJL: QSCP also aims to expose and undo the structural oppressions inherent in scientific work, it aims to open the door and hold space for other ways of knowing. Thus, a (critically) queer science communication pedagogy must embrace these spaces for ignorance as an opportunity to engage and learn, and not simply correct and blame.

Both: As such, instead of instructional 'tools', we provide here a series of questions to prompt and guide our readers as they go forth and queer their pedagogical spaces in new and exciting ways:

- Who is in your communication project?
- What stories are we telling about science in both the past and the present?
- Which scientists are we valorising? Are they the cis-white-heterosexual men of the Global North?
- What does not having these people/practices included in science communication tell us about the societies we are telling stories about?
- What kinds of science are we missing? Why?

- How can we extend a QSCP beyond the “obviously” queer locations and topics in science?
- How can queer actions disrupt norms, categories, and practices that are bound up in social structures and reproduced through communication practices?
- What do norms of science communication practices tell us about our motivations for doing science communication?
- How might science itself be implicated in the binaries of hetero/homo, scientist/public, expert/lay?
- How can we elevate narratives from the Global South, Indigenous knowledges as well as knowledges and science in the West that fell outside the science/non-science binary?
- What larger social norms does your science communication speak to? How is it unpacking, critically interrogating, or disrupting the reproduction of these norms when you are teaching science communication?
- How can we challenge the mobilization of norms and binaries through science communication?
- What does science (and by extension, science communication) gain from continuing to perpetuate binaries?
- Why are we teaching science communication at all?
- What is a science communication pedagogical process trying to achieve or produce?
- What sorts of science communicators would a QSCP aim to produce?

We hope through our dialogue (and asking you, reader, to reflect on these questions) we have presented some possibilities of what a QSCP might look like. We ask our readers to embrace the idea that science communication is never simply about the transference or representation of information but is always fundamentally involved in politics, cultural reproduction and power. A QSCP is not simply about adding in a smattering of queer scientists to the examples we use, it is about being aware of why they were not their in the first place, it is aware of the power of scientific narraitves to shape and constrain our lives under a dominant white cis-heteronormative patriarchy - it is disruptive, decentring, liberatory and non-binary.

References

Ahmed, S. (2010) ‘Happy Objects’ in M. Gregg, GJ. Seigworth and S. Ahmed (eds) *The affect theory reader*, Duke University Press. pp. 29-51

Bergner, D. (2009) ‘What do women want’, *New York Times Magazine*, *22*, pp1-12.

Britzman, D. (1995) ‘Is there a queer pedagogy? Or, stop reading straight!’, *Educational Theory*, 45(2): 151–165.

Cech, EA and Waidzunas, TJ. (2021) ‘Systemic inequalities for LGBTQ professionals in STEM’ *Science Advances*, 7(3): eabe0933

Cipolla, C., Gupta, K., Rubin, DA. and Willey, A. (eds) (2017) *Queer feminist science studies: A reader*. University of Washington Press.

Dawson, E. (2019) *Equity, exclusion and everyday science learning: The experiences of minoritised groups*. Routledge.

Duggan, L. (2002) ‘The new homonormativity: The sexual politics of neoliberalism’, in R. Castronovo, D. Nelson and DE. Pease (eds) *Materializing democracy*, Duke University Press, pp. 175-194.

Dyer, J., Townsend, A., Kanani, S., Matthews, P., Palermo, A., Farley, S. and Thorley, C. (2019) *Exploring the workplace for LGBT+ Physical Scientists*, Royal Society of Chemistry.

Er-Chua. G., (2009) ‘Arousing questions about female sexuality’ *The Queens Journal*, [online] February 9, 2009, Available from: https://www.queensjournal.ca/story/2009-02-09/features/arousing-questions-about-female-sexuality/ [Accessed 2 August 2021]

Fraser, N., (1990) ‘Rethinking the public sphere: A contribution to the critique of actually existing democracy’, *Social text*, (25/26): 56-80.

Freire, P., (2018) *Pedagogy of the oppressed*. Bloomsbury Publishing USA.

Fuss, D. (2013) ‘Inside/Out.’ in Fuss, D. (ed) *InsideOut: Lesbian theories, gay theories*, New York: Routledge, pp 1–13.

Gieryn, T.F., (1983) ‘Boundary-work and the demarcation of science from non-science: Strains and interests in professional ideologies of scientists’, *American sociological review*, Vol. 48, No. 6: 781-795.

Giroux, H.A., (2020) *On critical pedagogy*, Bloomsbury Publishing.

Greene, F. L. (1996) ‘Introducing queer theory into the under- graduate classroom: Abstractions and practical applications’, *English Education*, 28(4): 323–339.

Haraway, D., (1988) ‘Situated knowledges: The science question in feminism and the privilege of partial perspective’, *Feminist studies*, *14*(3),: 575-599.

hooks, B., (2003) *Teaching community: A pedagogy of hope* (Vol. 36), Psychology Press.

Hosseini, S. (2018). ‘The Sexist Science Of Female Sexual Dysfunction’, *The Establishment*, Available from: https://theestablishment.co/the-sexist-science-of-female-sexual-dysfunction/index.html, [Accessed 3 August 2021]

Kaishian, P. and Djoulakian, H., (2020) ‘The Science Underground’, *Catalyst: Feminism, Theory, Technoscience*, *6*(2).

Liboiron, M., (2021) *Pollution is colonialism*. Duke University Press.

Lock, SJ., (2008) *Lost in translation: Discourses, boundaries and legitimacy in the public understanding of science in the UK*. PhD. University of London, University College London.

Luhmann, S. (1998) ‘Queering/querying pedagogy? Or, pedagogy is a pretty queer thing’, in Pinar WF. (ed) *Queer theory in education* Mahwah, NJ: Earlbaum, pp 141–156.

Morris, M. (1998) ‘Unresting the curriculum: Queer projects, queer imaginings’, in W. Pinar (ed) *Queer theory in education*, Mahwah, NJ: Earlbaum, pp 275–286.

Prepster. (2020) *Requisite Campaign Briefing*, Available at: https://prepster.info/wp-content/uploads/2020/12/The-Requisite-Project-Campaign-Briefing.pdf [Accessed 5 August 2021]

Roberson, T. and Orthia, L.A. (2021) ‘Queer world-making: a need for integrated intersectionality in science communication’, *Journal of Science Communication*, *20*(1), p.C05

Rokas, A. (2018) ‘Where sexes come by the thousands’, *The Conversation*, October 30, 2018, Available from: https://theconversation.com/where-sexes-come-by-the-thousands-105554 [Last accessed 2 August 2021]

Shlasko, GD. (2005) Queer (v.) pedagogy. Equity & Excellence in Education 38(2): 123–134

Simon, N. (2016) *The Art of Relevance*, Santa Cruz, CA: Museum 2.0.

Spurgas, AK. (2020) *Diagnosing Desire: Biopolitics and Femininity Into the Twenty-first Century*, The Ohio State University Press.

Terry, J. (1997) 'The Seductive Power of Science in the Making of Deviant Subjectivity. Science and homosexualities', in Rosario, VA. (ed) *Science and Homosexualities* Routledge, pp 278-302.

Warner, M. (ed) (1993) *Fear of a queer planet: Queer politics and social theory*, U of Minnesota Press.

Vigour, L. and Cook, N. (2018) 'Six personal health zines that might change your life', *Wellcome Collection,* 4 October 2018, Available at: https://wellcomecollection.org/articles/WsT4Ex8AAHruGfWz [last accessed 5 August 2021]

Winchester, O. (2012) 'A book with its pages always open?' in Museums, Equality and Social Justice, ed. by Sandell, R. and E. Nightingale (eds) Oxon: Routledge, pp 142-155