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5. TEACHING QUEERING PHYSICS

An Agenda for Research and Practice

Being a professor of gender in engineering and information technology at a university of applied sciences, I am always pondering the meanings of gender and diversity in science, technology, engineering, and mathematics (STEM). For instance, I challenge the predominant binary social attributions of technological competence and gender, and I integrate the findings into my teaching of basic physics. In addition, I study processes of naturalization and normalization in physics education. To me it is obvious to scrutinize engineering from the perspectives of gender studies and queer theory. For example, even today, in mechanical and electrical engineering, women and young people with nonbinary gender identities are still not accepted as “proper” members of the scientific culture. Homosexuality, too, seems to threaten the masculininity presumably inherent in legitimate technical actors. Normative ideas about users are inscribed in the artefacts of engineering science. Study materials use masculine language and orient their examples almost exclusively towards “normal” white male biographies, and thus address only one segment of the engineering student population.

At the same time, at our university and, as far as I know, at other universities in Germany, hardly any of the current discussions and considerations about the relevance of gender exceed equity initiatives for women in STEM, which mostly reinscribe conventional norms of knowing and being. However, in my research project, teaching queering physics, I am studying methods and techniques for teaching both physical knowledge and competencies of questioning representations and norms of physical talent, technological competence, heroes of the history of physics, presumptions of heterosexual normativity, hegemonic masculinity, and much more. This project brings to the fore norms and normative processes, as well as the resulting multiple exclusions of some people from STEM subjects, where these insights can be integrated into recommendations on teaching. In this chapter I wish to outline an agenda for research and practice of teaching queering physics, and to inspire other scholars and teachers to fruitfully bridge the gap between queer and deconstructive theories on one side and traditional positivist sciences on the other side.
TEACHING QUEERING PHYSICS WHILE TEACHING PHYSICS

As a former professor for gender and interdisciplinary studies in pedagogy, I used to teach theories and research results from gender studies and queer theory in courses for students of science and science education at Darmstadt Technical University. Now, as a physics professor at Hannover University of Applied Sciences and Arts, I teach students of electrical, mechanical, and industrial engineering. My students are mostly male with diverse ages, education and/or work experiences, first languages, nationalities, and ethnic and social backgrounds. They might differ in their sexual orientation and gender identity, too, but they keep these secret, because LGBT+ issues remain a great taboo in engineering in Germany.

Teaching queering physics in (under)graduate science and science education is not limited to adding knowledge about queer theory to the curriculum of future engineers and science teachers. Teaching queering physics is an act of explicitly or implicitly translating complex theories and deconstructive methods to students of science education and science. This will enable students to reflect on their understandings of physics and physical knowledge and on their participation in the (re)production of “(hetero)normative facts,” and by doing so to enact and engage in critical science literacy. The first and foremost aim of my physics course is to offer an inviting, open, and encouraging lecture format. Therefore, I ask myself the challenging question: How can I teach my first-semester engineering students queering physics while I teach them experimental physics in a four-hour lecture? How can they be enabled to critically question and transcend norms around gender, sexuality, desire, narratives, cultures, facts, and other powerful social categories that shape hegemonic presentations of physics and physicists? I treat these critical abilities as competencies of queering that are needed by all science and engineering students, and certainly those in my own discipline of physics.

In this chapter I offer some examples from my current teaching practice and exploratory research in a field I term “applied gender research in physics” or, more specifically, “teaching queering physics.” The queering strategies I have been using so far could be described as scrutinizing what is supposed to be normal and what is invisible or silenced, making the familiar strange, reflecting on the discursive production of physical knowledge, and revealing narratives of physics as hegemonic presentations. At best these strategies will turn my physics course now and then into a space welcoming queer perspectives and identities, as well as into a training environment for queering thinking. Bridging the gap between traditional positivist sciences and queer and deconstructive theories poses several questions. First, can deconstructive approaches that perceive gender and sexuality as performative and material-discursive entities be applied to physics? Second, can we translate these reflections into empirical research? Third, can the resulting findings inspire a constructive treatment of gender and sexual heterogeneity in the training of science and engineering students, as well as of future science teachers? And finally, can these considerations be translated into teaching practice? My answer to all four questions is “yes,” on the following grounds.