

# **Modernity, coloniality and the “making” of the science learner.**

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This paper aims to deconstruct how the practice of science is discursively attached to certain parts of the world and certain “kinds of people”. In empirical focus are how the history of science is made up in science textbooks and how the power technology of coloniality organizes the scientific content as well as how different categories of science students are acted upon in the science classroom. Through historicizing and illuminating how a colonial, legacy of science organizes cultural understandings of what science, and the science literate person, commonsensical understandings can be understood and disrupted.

The theoretical foundation for the article is Foucault’s (1983) work on discourse and the co-construction of power/knowledge. Power and knowledge are inseparable categories and operate together in the making of truth as well as (im)possible subjectivities and categorizations of the normal and the deviant. These makings of belief systems and humans are not innocent; they act upon thinking, acting and the living conditions of human beings. Hacking (1995) calls it “looping effects”; discursive constructions act on the world by in concrete and material ways (Popkewitz, 2008).

To deconstruct the power/knowledge exercise I employ Spivak’s (1988) concept of epistemic violence; an exercise of power through limiting the understanding of valid knowledge. She puts light on how notions of knowledge, civilization and education have been used to undermine non-Western methods or approaches to knowledge. By that, she problematizes not only the colonizers use of science and technology, but also today’s efforts by providing technology, medicine and education to the “uncivilized” parts of the world. Another central concept in the analysis is coloniality; the patterns of power that emerged as a result of colonialism, but still organize intersubjective relations and knowledge production. It is often expressed in a language of salvation, help or development (Mignolo, 2011). Coloniality is claimed to be the modernity’s other face (McClintock, 1995; Castro-Gómez, 2002); the entanglement of scientific reason, coloniality and the idea of modernity are constantly reproduced – in education and elsewhere. This strong connection between the scientific

(technological) development and colonialism can be illustrated through sociologist Max Weber's work (in Hobson, 2004). He positioned modernity to the Occident and its opposite, tradition, to the Orient in what he conceptualizes as the "great rationality divide".

Drawing on these theories, the paper discusses how science and coloniality not only shape the images of the world and of the sciences, but also how science teaching is organized for different student groups. The students who are made up as object for change can be positioned "somewhere else"; educational aid is working on civilizing the poor, underdeveloped people in the global South. But the students who should be taught into scientific reason are also found "at home"; students considered as in need of being integrated into society. These are most often students outside the norm (immigrant students, students of color, students from "socially deprived" conditions) (Popkewitz, 2008). I'll argue that these students are objected to epistemic violence, justified by scientific reason. Here, the analysis draw on the theories of Ahmed (2010) on how certain characteristics are culturally attached to certain kinds of people – in terms of bodies, nationalities, cultures and languages. For instance, how is the immigrant science learner "made" in a discourse of coloniality?

### **Methodology**

This paper does not only study what is said, but also what is left un-said in the science curriculum. But how do you recognize and study a missing narrative, a silence? I understand science education material – textbooks, research papers etc. – as cultural archive telling what science respectively the scientific literate person are (Ahmed, 2010), and try to read against the grain in order to search for what is not there and how that silence affect what is possible to think, say and do (Carter, 2006)?

To capture both the silences and the taken for granted noisy discourse (and how they interplay) I have looked into different kinds of sources. Inspired by Marcus' (1994) notion of multi-sited ethnography, conceptualizing how the researcher follow a question rather than a specific, delimited place and time, this study can best be described as a multi-sited desk study. It aims to put pieces together, understand and deconstruct how the colonial legacy of science organizes science education of today.

The empirical data consist of different kinds of sources. Firstly, textbooks directed to secondary school since these are the school years when to expect a more complex teaching on the history of science. I have analyzed eleven Swedish textbooks from the subjects of biology, physics, chemistry and ‘natural sciences’ (a subject for non-science students in upper secondary school). As well, I used one book from the subject of history with the purpose of capture a silence in the science discourse.

The analysis of the science textbooks was guided by three themes addressing noise and silences, what is said and what is un-said: 1) if and how the colonial history of science is described in Swedish textbooks; 2) how science history is described and; 3) how the global South is represented. Hence, the concepts of power/knowledge, epistemic violence and coloniality are useful to deconstruct how the textbooks represent (or not) different part of the world and different historical moments. The questions, as well as the analysis, were guided by a reading of science history books and how an alternative story on science history could be told.

In the study of the science learner I use previous studies on the image of the science learner from inside and outside the context of Sweden. These studies help to draw lines between the practice of science, cultural imaginations of different places and the making of human kinds.

## **Conclusion**

The analysis shows that what has been – and still is – made in the name of science in the colonial project is not present at all in the science textbooks. It is a silence inside the school science discourse. Noisier is the talk about science as rational and necessary for the societal development. The positive image of science and the societal need for science hides the physical and epistemic violence done in the name of civilization. In other words, colonialism is more or less not described in the science textbooks, while coloniality is organizing the content, also when it comes to how different parts of the world are described. What is told about the global South is that it is the home of natural resources that can be “refined” in the global North and the origin of humans. The South is representing pre-technology and pre-history.

What does it mean for the “making” of the science learner? How does the “great rationality divide” organize the science classroom in North populated by immigrant students? Studies show how the characteristics of the modern child – such as scientific rationality and liberal values – are culturally stuck to white children from the North, while the opposites –traditional and/or religious values - are attached to racialized, immigrant children (Gitz-Johansen, 2004). Specifically for science, the approach of biology lessons differs depending on the color and/or ethnic background of the children. Racialized, immigrant children are objected to “civilization” in the name of science: eat better, sleep better and take care of their hygiene (e.g. Ideland, Malmberg & Winberg, 2011; Mutegi, 2013).

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