

Gender Awareness in Teacher Education: Towards an Embodied and Inclusive Approach to Elementary Science Education

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Abstract

In order to contribute to a more inclusive and equitable education, this paper reflects on the need to include gender awareness in Science Teacher Education. This research outlines an embodied and inclusive approach to Elementary Science Education in Teacher Education, based on the literature review, namely in what concerns Gender issues in Elementary Science Education Curricula and Sex Education Curricula, as well as on situated case studies that evidence gender inequalities in elementary schools and the challenges faced by pre-service and in-service Elementary School Teachers regarding these inequalities. The approach here proposed queers binary categorizations: i) emphasizing the integration of cognition and emotion, in an embodied approach; ii) questioning the “natural” heteronormativity and the sex/gender binaries, in a more inclusive attitude. In this work, it is argued that such science (and sex) education approaches should support the development of sexual identity, including the development of gender identity, this way also supporting the development of inclusion and equity in schools and in society.

Keywords: Gender; Elementary Science Education; Teacher Education; Inclusion

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Introduction: Gender inequalities, science education and sex education in Portugal

In order to contribute to a more inclusive and equitable education, this paper reflects on the need to include gender awareness in Teacher Education Science Curricula. To be aware of the Gender Gap – in what concerns education, economic participation and opportunity, health and survival, and political empowerment (World Economic Forum, 2015) – is a fundamental part of citizens' gender awareness. Nevertheless, a broader approach to gender awareness considers the need to question “natural” heteronormativity and the sex/gender binaries.

The Gender Gap still is an international problem, hindering personal and human development. In Portugal, the salary gap is still a significant issue, since in what concerns wage equality for similar work Portugal scores 0.57 (1 stands for equality), while women spent in average more 230 minutes than men per day on unpaid work (World Economic Forum, 2015).

In schools, discrimination and bullying on grounds of gender identity and sexual orientation has been widely reported (Hoelscher, 2012; Ferreira, 2011a; Nogueira & Oliveira, 2010;). In 2009, the Commission for Citizenship and Gender Equality (CIG) supervised a research project: “Study on Sexual Orientation and Gender Identity Based Discrimination” (Nogueira & Oliveira, 2010). This was the first comprehensive research project on this subject conducted in Portugal, and aimed to advance the knowledge of these populations regarding access to rights, discrimination, and citizenship. The final report identifies an overall context of social discrimination in Portugal; emphasising that LGBT (Lesbian, Gay, Bisexual, and Transgender) people often feel discriminated against mostly being subjected to insults, and that the institutions they felt most discriminated by were associated with the church and the state. The model of heterosexist thinking was reported to be the most crucial factor supporting discrimination or unfavourable opinion towards LGBT rights, and it was most common among men, and within the family, among fathers (Nogueira & Oliveira, 2010). This report's results are in line with the understanding that “although legal change is of key importance, it is not enough to guarantee the respect and recognition sought by LGBT intimate and sexual citizens” (Santos, 2013, p. 9). Portugal has wide-ranging antidiscrimination laws and is one of the few countries in the world to include in its Constitution a ban on discrimination on the grounds of sexual orientation, however social discrimination on grounds of sexual orientation and gender identity is still a pervasive reality. In Portugal, recent research on public spaces and same-sex displays of affection (Ferreira, 2011b) revealed that the majority of lesbians and gays tend to confine same-sex displays of affection to private spaces. It

was particularly relevant that younger lesbians and gays reported the same apprehension of displaying same-sex public displays of affection as older members of the same communities.

Discrimination against non-heterosexual sexual orientation and against non-cisgender identities are clearly linked to discrimination based on gender (Hoelscher, 2012).

Conceptions of gender and sexuality are social constructions contextualised by a specific time, geographical, social, economic and cultural context. However, science and science education often approach these issues as being objective knowledge produced by the natural sciences, propagating social beliefs about what is “natural”, supported by the authoritative role of Biology, establishing and perpetuating societal norms of gender and sexuality (Ah-King, 2013). This approach to science education is pervasive in western schools and has a substantial influence in school cultures, reinforcing heteronormativity and sex binary conceptions (Ah-King, 2013).

Since schools reproduce dominant social power relations, science educators should integrate a rich understanding of sex/gender and sexuality in their practices, to link the complexity of gender and sexuality to scientific knowledge and practice (Bazzul & Sykes, 2011).

The next section of this paper reviews related work that queers science education, specifically in what concerns sex, gender, sexual orientations and identities. Afterwards, this paper presents two case studies that evidence gender inequalities in Portuguese elementary schools and the challenges faced by Portuguese pre-service and in-service Elementary Science School Teachers regarding these inequalities. Subsequently, the concluding remarks are presented.

Related work: queering science education

To address gender awareness in an inclusive approach, it is important to review and present relevant work related to gender in Science Education.

Firstly, there is a need to emphasize that the relations between life science curriculum and health, and between health and sex generate opportunities to the development of a gender/sex inclusive approach in science education (Hoelscher, 2012).

The evaluation of science handbooks, using queer lenses (questioning hegemonic and dichotomous notions of sex, gender, and sexuality) showed evidences of heteronormativity, sex/gender dichotomies and invisibility of non-heterosexual sexual orientation and non-cisgender identities (Gunckel, 2009; Bazzul & Sykes, 2011). Transgendered, hermaphroditic, intersexed, and transsexual people are excluded from the definitions presented (Bazzul & Sykes, 2011). Using

hierarchical sex (penis/vagina) /gender (masculine/feminine) dichotomies, subjects such as morphological and physiological interpretations, hormones, non-reproductive sexual behaviour in nature, and history of science are approached in a heteronormative and discriminative way. For instance, the association of hormones with heterosexual relationships suggests that heterosexuality is the 'natural' response to the biology of hormones and their interactions with bodies (Bazzul & Sykes, 2011).

Some examples of possible ways to 'queer' science text books are mentioned by Malin Ah-King (2013): "showcasing diversity; avoiding stereotypes of female and male behaviour; explaining how behaviour varies in relation to ecological circumstances, and using gender-neutral language such as 'parents invest in their offspring', and 'different species have different sexual systems'" (p.70).

The fact that most science text books describe animal sexual behaviour almost only in a heterosexual context, may have a large impact on what students perceive to be "natural" male and female behaviour and affects social identity-making. It is important to destabilize dichotomous conceptions of sex, questioning the understanding of female and male behaviour as distinctly different and mutually exclusive (Ah-King, 2013).

Queering science education means to deconstruct gender and sex binaries, interrogating in a broad and systematic way the construction of sex and gender (Carrera, DePalma & Lameiras, 2012).

Sex is not a binary feature for human beings – rather than being simply male or female, there are various dimensions of sex, such as chromosomal sex or hormonal sex, and all of us exist across several spectrums of sexual identity. Notwithstanding the emerging recognition by scientific research that people come in bewildering sexual varieties, there is still intense social pressure to conform to the binary model (Fausto-Sterling, 2000).

Queering science education means making the invisible visible (Gunckel, 2009), and letting students develop their own ideas and narratives on gender and sexualities (Bazzul & Sykes, 2011).

Teaching biology mediates knowledge that shapes the way students make sense of themselves and of science, and that is why queer theory is so important to science education. Gender and queer perspectives have the potential to increase critical thinking, among both teachers and students, disclosing how scientific knowledge is dependent on the social context (Bazzul & Sykes, 2011). As Snyder and Broadway (2004) argue: "Using the lens of queer theory, we can view the hegemonic matrix, interrupt heteronormative thinking, and broaden all students' potential for interpreting, representing, and perceiving experiences." (p. 621).

There is a need to study how we construct notions of boy and girl, interrogating in a broad and systematic way the construction of sex and gender

(Carrera, DePalma & Lameiras, 2012). Reviewing previous studies that queered environmental education, Russell (2013) argues that a queer ecopedagogy can promote "embodied attentiveness and reflection on being or feeling queer in the world" (p. 13) to critically address the oppression and silencing of a wide range of beings, while "exploring uniqueness and diversity among ourselves, each other, and the more than-human world" (p.24).

In this paper, the authors emphasize an embodied and inclusive approach that defies binary categorizations, such as cognition and emotion, and the sex/gender binaries.

Case studies on gender and heteronormativity in schools

In this section, the authors present case studies to illustrate gender stereotypes and inequalities in Portuguese elementary schools and the related challenges faced by Elementary Science Teachers and Teacher education students.

Case study on gender and sexuality with a 6th grade class

In a case study on gender and sexuality, developed during science education activities with a 6th grade class, by a science teacher/researcher, it was possible to observe children's gender stereotypes and sexist and heterosexist attitudes (Dias, 2011; Silva et al., 2011).

The analysis of real situations, inquiry activities and debates made it possible to deconstruct prejudices, pointing to the utility of these didactical strategies to develop gender awareness and inclusion (Silva et al., 2011). In an activity on masculine and feminine characteristics, children started by showing stereotypes regarding masculine and feminine characteristics (such as boys are rude and girls are tricky) and professions (police is a masculine profession and babysitter is a feminine one). However, after discussing the stereotypes related to professions, children's conclusion was "all professions can be performed by both men and women. In the same way, when portraying two public figures (a popular Portuguese TV presenter, Julia Pinheiro, and a football player, Cristiano Ronaldo), children overcame gender stereotypes, mixing "female and male characteristics", saying that Julia is a leader, and that she is powerful, brave, boring, caring, loving and kind, while Cristiano is sensual, shaky and stylish (Dias, 2011; Silva et al., 2011).

Young students display a strong emotional reaction when talking about human sexuality and have a keen interest towards the subject, predisposing them to work these themes in the classroom (Ministério da Educação et al., 2000). When discussing human sexuality within the school context one must take into account the age of the students as well as their social and cultural context. Sex education is a subject where participatory

approaches are most effective; it is important to capitalize on existing knowledge and to promote the discussion in small groups (Frade et al., 1992). In this case study all the activities took into consideration the questions raised by the class, addressing students concerns and questions. All the students were interested and had a participatory and collaborative attitude. They were more enthusiastic and willing to discuss about not purely biological concepts, although they also expressed interest on the reproductive systems, their organs and functions. Some of the questions addressed by students were related more specifically to the biological dimension, such as: "What causes the menstruation?", "Where are located the female and male organs of the reproductive system?", "What is sperm?" And "Why the sperm comes out from the penis?" Teachers must be prepared to talk about these questions and, considering their scientific training, Natural Science teachers are a potentially privileged group to work sexual education issues from a biological point of view. It should be noted, however, that many teachers of Natural Sciences merely focus on the biological aspects when talking about human sexuality, avoiding other sexuality issues, such as emotions, gender identity, relationships and sexual orientation, which are so important to students and of most importance to guarantee a comprehensive approach to sexual education. Even when talking strictly about the biological aspects of sexuality many teachers, including Natural Sciences teachers, reproduce the socially dominant idea, that sex is binary, male or female, and do not have in consideration the scientific evidences of the fluidity of sex (Fausto-Sterling, 2000). This scientific limitation hinders the possibility of an up-to-date and comprehensive approach to sexuality issues. For instance most teachers are not prepared to talk about transsexuality or intersex, reinforcing the idea of two fixed and mutual exclusive sex identities, reinforcing male and female stereotypes.

In this case study students raised questions like "What do you mean by transsexuality?" and "What is heterosexuality?", evidencing some confusion between homosexuality, travesties and transsexuality. To talk about these questions teachers must guarantee no bias to avoid reinforcing and reproducing prejudices and social stereotypes.

The way children formulated their questions during the case study supported the connection between diverse aspects of sexuality, including biological, behavioral and values. That is why it is important that teachers are prepared to talk about sexuality issues using a comprehensive approach, going beyond the biological aspects. Teachers should adopt a critical perspective that discloses how scientific knowledge must be contextualized in specific social and cultural norms. This approach is particularly important when talking about gender, gender roles and sexuality. At a time when students are entering adolescence and identity issues are so

important and pervasive, it is crucial that school scaffolds their curiosity, inquiries and quests by providing a critical perspective on sexuality. School should support children in the construction of sex and gender identities, promoting the exploration of their uniqueness as well as diversity among others, broadening students' potential for interpreting, representing, and perceiving their experiences.

Case study on transgenderism with elementary science education teachers

In another case study, which included a focus group with Elementary Science Education teachers, the role that teachers can play in issues related to transgenderism in schools was explored (Ferreira, 2015a). It was possible to uncover the difficulties teachers face when dealing with transgenderism issues. Some of these difficulties were related to teachers' lack of preparation and training on gender and sexuality, and to gender stereotypes, which are often perpetuated by teachers in activities and resources.

When discussing transgenderism with Elementary Science Education teachers, the discussion was often focused on sexual orientation rather than on gender identity. This was a common difficulty amongst teachers who participated on this case study. For example, when asked if it is more acceptable a boy to behave like a girl or vice versa, the teachers' comments were focused on sexual orientation: "I don't know any jokes about lesbians, but I know a lot of jokes about gays..."; "I know who makes the distinction between a gay man and a fagot man ...".

One of the main difficulties in discussing gender identity and sexual orientation with teachers was dealing with bias and prejudice. As illustrated by the example above, the comments had always a certain touch of unquestioned stereotypes and prejudice. Teachers themselves are not free from bias and prejudice, which compromises the possibility of educating students to have a comprehensive approach to sexuality and respectful positioning towards non normative gender identity or sexual orientation.

When faced with the question "What is better accepted, girls behaving like boys or boys behaving like girls?", Elementary Science Education teachers said that based on their experience in the schools where they worked, girls behaving like boys "are better accepted, their behaviour is almost considered normal", as for the boys with more feminine behaviours they are always subject to criticism even if they are not openly discriminated or exposed to bullying. Teachers identified cultural and social norms as the reason for this difference; it is culturally more visible / detectable a man displaying a behaviour perceived as female, than women displaying behaviours perceived as male. According to the teachers, at the present time social norms on women behaviours are more inclusive than on men behaviours, for instance women can wear trousers

and neckties but men cannot wear skirts without being exposed to social criticism. Although teachers' statements evidenced some degree of awareness of the importance of social norms on gender roles and on individual gender identity and behaviours, they did not question or elaborate on how the social context restrains and determines gender roles.

Elementary Science Education teachers acknowledged that teachers play an important role in the sex education of students, and that it is important to talk about gender and sexuality with the students, although they feel that most teachers are unprepared and do not have sufficient information or training for this task. The Elementary Science Education teachers stated that they often deal with problematic situations related to sexuality in everyday school life more based on their own sensitivity and context evaluation than on educational guides or resources. Besides not having the adequate training to talk about sex issues with students, teachers also claim that there are not available and trustworthy resources to support them.

During the entire discussion no teacher suggested diverse ways to address gender identity or questioned the gender binary. It is crucial to promote teachers' critical thinking on gender and gender identity, so that they can go beyond prejudices and bias to be facilitators of questioning normativities and support students to develop their own ideas and narratives on gender and sexualities.

Case study on transgenderism with teacher education students

In this case study, the group of Teacher Education students were asked to imagine the following situation: they were teaching in a school with students from the 5th to the 12th level of education, and one student from the secondary level of education was taking hormones and undergoing the process of sex change. As teachers of the 5th and 6th classes, what would they do?

After discussing the situation the Teacher Education students considered that the most adequate behaviour would be to explain and contextualize the situation with the students. It would be necessary to help children to understand the sex change process and the difficulties it presents to the person involved, both psychologically and physically. Most important of all would be to clarify the students' doubts and questions, considering that the lack of knowledge on the subject may lead to non-acceptance and even to aggressive behaviours. Some of the Teacher Education students thought it would be a good idea to invite a doctor to talk with the students about transgenderism, disclosing the idea that this is a medical condition rather than a matter of social identity. The Teacher Education students also stressed the importance of including transgenderism issues in students' education even if there was no transgender cases in the school, to prevent prejudice and discrimination on grounds of gender identity.

The Teacher Education students referred the complexity of transgenderism, emphasizing the multiple factors they should consider when dealing with such topic in schools, such as the diversity of children, teachers and families, the prejudices of each actor, and the internalized discrimination of transgender children. As in teachers' focus group, these students considered transsexuality as the more challenging topic, when analysing transgenderism. This group of Teacher Education students had addressed topics on gender and sexuality during the course, which provided them competences to reflect on it in a productive way, making visible the advantages of having training on sex/gender and sexuality in initial teacher education (Ferreira, 2015b).

Concluding Remarks

This paper acknowledges the need for queering science curricula, since sex/gender binaries and heteronormativity in science education shape the representations that students develop, both of themselves and of science (Bazzul & Sykes, 2011). Furthermore, this paper emphasizes that gender awareness in science education is as much important as categorical understandings of sex and gender contribute to the inequality, oppression, and exclusion of anyone who transgresses, consciously or not, gender roles (Carrera, DePalma & Lameiras, 2012).

The case studies presented in this paper, and developed in the context of elementary education, with children, science teachers and Teacher Education students, illustrate the need for specific gender inclusive pedagogical practices, both in school and in teacher education.

The analysis of the case studies revealed, as Gunckel (2009) has argued, that there is a need for addressing the role that sexuality plays in learning science. The case study developed with children clarified the importance of embodied and participatory learning activities that integrate biological, attitudinal and behavioural dimensions of sexuality, to overcome gender stereotypes and prejudices. The case study developed with Elementary Science Education Teachers and Teacher Education students showed that there is a need for information and didactical resources in what concerns addressing gender questions, such as transgenderism.

At this moment, it is important to stress that teachers' training on gender and sexuality is critical to support inclusive pedagogical practices and that the role of teachers can be decisive to promote non-discriminatory school contexts, for example, as pointed by Hoelscher (2012), using inclusive language such as 'differences' instead of 'abnormalities or disadvantages' can make a significant difference in the way gender and sexual diversity is perceived by students.

Accordingly, the authors of this work stress the importance of an inclusive embodied approach to

link knowledge, sexuality, and identity, and to question “natural” heteronormativity and the sex/gender binaries, in a more inclusive attitude. The approach here proposed queers binary categorizations: i) emphasizing the integration of cognition and emotion, in an embodied approach; ii) questioning the “natural” heteronormativity and the sex/gender binaries, in a more inclusive attitude. Such science (and sex) education approaches should support the development of sexual identity, including the development of gender identity, this way also supporting the development of inclusion and equity in schools and in society.

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