



GIVING MEANING¹ TO TEACHERS' DISCOURSES RELATED TO BIOLOGY KNOWLEDGE FROM FEMINIST EPISTEMOLOGIES

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ABSTRACT:

This research aimed at analyzing utterances regarding gender and power relations observed in teachers' discourses addressing certain biology knowledge and giving them meaning from the standpoint of feminist epistemologies. The participants were six university professors working in a public institution. The analysis corpus was built up using semi-structured interviews. The utterances were analyzed relating Foucault's tools and feminist theories. We observed the repetition of discourses that naturalize social relations from biology knowledge, discourses that keep dichotomies and silence diversity, and discourses humanizing cells and molecules. Discourses of the science critique and of resistance to different modes of oppression were also repeated. What is said or not when teaching sciences is influenced by power and knowledge relations, thus, some discourses are evidenced in detriment of others, since circulating other truths confronts such power relations.

Keywords:

Sciences and Biology teaching;
Feminist epistemologies;
Teachers' discourses.

DAR SIGNIFICADO A LOS DISCURSOS DEL PROFESORADO SOBRE CONOCIMIENTOS DE LA BIOLOGÍA DESDE LAS EPISTEMOLOGÍAS FEMINISTAS

RESUMEN:

El objetivo de la investigación es analizar los enunciados de género y las relaciones de poder presentes en los discursos del profesorado sobre algunos conocimientos de la biología, significándolos desde las epistemologías feministas. Participaron seis profesores/as universitarios/as de una institución pública. El corpus de análisis se construyó a través de entrevistas semiestructuradas. Se buscaron los significados de los enunciados relacionando las herramientas de Foucault y las teorizaciones feministas. Se reiteraron discursos que naturalizan las relaciones sociales desde el conocimiento de la biología; discursos que mantienen dicotomías y silencian diversidades; discursos que humanizan células y moléculas. También se reiteraron discursos de crítica a la ciencia y de resistencia a diferentes modos de opresión. Lo que se dice o no se dice en la enseñanza de las ciencias está influenciado por las relaciones entre poder y conocimiento, por lo que se destacan ciertos discursos en detrimento de otros. Poner en circulación otras verdades afronta estas relaciones de poder.

Palabras clave:

Enseñanza de Ciencias y Biología;
Epistemologías feministas;
Discursos del profesorado.

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SIGNIFICANDO DISCURSOS DOCENTES A RESPEITO DE CONHECIMENTOS DA BIOLOGIA A PARTIR DAS EPISTEMOLOGIAS FEMINISTAS

RESUMO:

O objetivo da pesquisa é analisar os enunciados de gênero e relações de poder presentes nos discursos docentes a respeito de alguns conhecimentos da biologia, significando-os a partir das epistemologias feministas. Os/as participantes foram seis docentes universitários/as de uma instituição pública. O corpus de análise foi construído por meio de entrevistas semiestruturadas. Os enunciados foram significados relacionando as ferramentas de Foucault e as teorizações feministas. Foram reiterados discursos que naturalizam as relações sociais a partir de conhecimentos da biologia; discursos que mantêm as dicotomias e silenciam as diversidades; discursos que humanizam células e moléculas. Discursos da crítica da ciência e de resistência a distintos modos de opressão também foram reiterados. O que é dito ou não no ensino de ciências é influenciado pelas relações entre poder e saber, assim, certos discursos são evidenciados em detrimento de outros. Pôr em circulação outras verdades afronta essas relações de poder.

Palavras-chave:

Ensino de Ciências e Biologia;
Epistemologias feministas;
Discursos docentes.

INTRODUCTION

Our personal experiences, education, cultural and life background, the historical, political, and social contexts experienced impact the science and research we develop since we understand knowledge as situated (Longino, 2008). Thus, I, the first author, position myself in this research as a woman, cisgender, mixed race (*parda*), feminist, and a professor of sciences and biology. In this research and writing process, I was aided by the second author of this article, my advisor, a white cisgender woman, feminist, mother, researcher, and professor in the biological sciences teaching undergraduate course. This article is part of the master's dissertation research developed by the first author, which analyzed discourses produced by university professors in the biology undergraduate course related to feminism, intersectionalities, gender issues, and sciences (Santos, 2021).

Gender issues in sciences are discussed by feminist epistemologies that adopted gender as a theoretical object and instrument of analysis (Sardenberg, 2002). Gender as an analytical category (Scott, 1995) allows the investigation and discussion of social differences based on gender and their consequences; the ways of constructing the woman, man, transgender, or dissident beings; and the consequences of expectations created for each individual in gender systems. It involves the resistance to the hetero/cis normative and patriarchal organization, the understanding of the power relations that structure society and the proposition of deconstructing these relations, among other possibilities of analysis.

The biology scientific knowledge is not neutral and entails power relations. Studies on feminist epistemologies have revealed the type of content built up in an androcentric way, that is, making women and other marginalized groups invisible, and reinforcing socially built prejudice and discrimination (Fausto-Sterling, 2002; Keller, 2006; Martin, 1991; Schiebinger, 2001).

In science teaching, the research carried out has raised some reflection upon how gender discussions are addressed in the area. Luiz Gustavo Franco and Danusa Munfort (2023) introduced the research developed by Jennie Brotman and Felicia M. Moore (2008), in the international context, which points out some advances and trends that have been observed since 1970. The studies proposed in the education and sciences areas have changed and tended to be organized around some themes such as the characterization and analysis of differences between

boys and girls (late 1980s); analysis of the curriculum that was seen as excluding and misogynous (1990s), analyses of the science nature and the scientific culture permeated by gender relations, and students' identification with certain subjects and/or scientific careers (late 1990s). In Brazil, in 2008, Ângela Maria Souza investigated two journals in the education area from 1998 to 2007 and reported the absence of gender research and feminist epistemologies connected to teaching and teachers' practices published in the A1 journals in the area.

Regarding teachers' education, specifically, a survey of journals and event proceedings from 2005 to 2011 was carried out. Seven articles were found that analyzed gender representations in textbooks, inferences and interpretations of gender relations and sciences, and theoretical reviews addressing gender (Batista *et al.*, 2011).

In 2015, Nathaly Chiari and Irinéia Batista surveyed event proceedings, journals, and monographs produced in postgraduate programs in the science teaching area from 2010 to 2014 and found thirteen studies discussing the gender theme inquiry in scientific education, teachers' education, and theoretical-methodological investigations for the development of approaches aiming at the insertion of gender discussions in scientific education and/or teachers' education. In 2019, Amanda Proença *et al.* continued the investigation based on event proceedings and journals between 2015 and 2017. They found 31 studies, including those already reported by Batista *et al.* (2011) and Chiari and Batista (2015). Research approaching gender in science teaching usually addresses themes such as gender representations in textbooks, inferences of women representation in sciences, students' conceptions and interests regarding sciences or scientific careers, theoretical studies, teachers' practices and education, women's participation in sciences, school interventions, and gender issues and sciences and the media.

Ana Flávia Silva, Ana Paula Santos, and Bettina Heerdt (2017) surveyed the research related to gender and scientific education between 2003 and 2016 in national and international journals (A1, A2 and B1), and found 33 articles. The number of studies in international journals (25) was higher than that in national publications (08). Those authors pointed out the absence of discussions on the gender theme in school interventions and teaching material and the urgent need for discussions addressing gender and teachers' education. In 2018, ninety journals in the science teaching area were analyzed, out of those 22 presented 34 articles (Heerdt *et al.*, 2018) and the research themes were classified as follows: gender in textbooks; boys' and girls' interest in science; need for the insertion of the gender theme in scientific education; educators' practices and education; women's participation in sciences; school intervention; gender and sciences in the media; students' science learning; students' interactions in sciences classes; and how gender is addressed in scientific productions.

Over the years, there has been an increase in the number of investigations focusing on the diversity theme. However, there are still gaps, we need to diversify themes and methodologies (Franco & Munfort, 2023), as well as theories and analyses. Thus, when reflecting upon gender and power relations that structure scientific knowledge, we question: how are gender and power relations uttered in educators' discourses when dealing with certain biology knowledge that has been criticized by feminist epistemologies? Considering that "[...] the utterances within each discourse mark and signal what is taken as true in a given time and space, that is, which establish a truth regime" (Veiga-Neto, 2007, p. 101), in this research we are concerned with analyzing gender utterances and power relations found in professors' discourses related to some biology knowledge, given them meaning from the standpoint of feminist epistemologies.

It seems relevant to consider that educators' discourses reflect the power relations in society and in the historical context in which they are inserted, that is, patriarchal, heteronormative, racist, classist, and sexist society. On the other hand, feminism discourses and resistance of different groups and fights for emancipation are also present in our historical context, and this bunch of relations form the discursiveness of professors. Therefore, in the same way that discourses reproducing inequalities circulate in schools and in sciences, discourses of resistance to power and discourses 'going against' whatever is imposed such as body and sexuality standards, among others, are also found.

We looked into professors' discourses and established dialogues with Foucault's theory and the science feminist epistemologies, focusing on concepts of power and knowledge relations (Fischer, 2001; Fou-

cault, 1979, 2008); situated knowledges (Haraway, 1995); sexism structuring sciences and their knowledges (Maffía, 2014; Schiebinger, 2001; 2008); reinforcement of social/cultural stereotypes of women and men through biological discourses; construction of discriminating discourses in some areas of biology such as human fertilization, sexual selection and hormones (Fausto-Sterling, 2002; Keller, 2006; Martin, 1991; Saini, 2018); dichotomies (Fausto-Sterling, 2002; Harding, 1993); metaphors and the biology scientific language (Keller, 2006; Schiebinger, 2001); and the feminist epistemology (Longino, 1997).

The research was carried out using semi-structure interviews with six professors working in the Biological Sciences Teaching undergraduate course in a higher education public institution in Paraná between 2019 and 2020. The data analysis was based on articulations and bricolage (Paraíso, 2014), joining Foucault's theories and feminist epistemologies of sciences to give meaning to the utterances produced by the participant professors.

We started this text by describing the theoretical-methodological detours² traced during the research development and then presented the analyses and reflections developed from the professors' discourses in dialogue with the theoretical background adopted.

THEORETICAL-METHODOLOGICAL DETOURS

The theoretical and methodological construction of this research was supported by the articulations and bricolage of post-critical research referring to the “articulation of knowledges and bricolage of methodologies” (Paraíso, 2014, p. 35). Therefore, the research was not based on a single theory or method. In fact, we sought to join different knowledges and combine methodologies to support this process.

The research project was submitted to the research ethics committee and approved by the Technical Opinion number 3.798.721. The analysis corpus was built up using semi-structured interviews, registered in audio recordings. Due to the coronavirus pandemic, which required social isolation, the interviews were carried out online, using apps with video call resources (Hangouts, Whatsapp, Skype and StreamYard).

The research participants were six professors working in a public institution, three of them were women and three were men, they are declared cisgender individuals. We selected professors whose initial education was on biological sciences/biology, both researchers and educators, who worked as professors in the biological science teaching course between 2019 and 2020. They taught subjects such as embryology, histology, cell biology, genetics, zoology of vertebrates, general ecology, and environmental education.

To guarantee anonymity, we gave the participant professors fictional names, which correspond to the names or surnames of women that played a relevant role in the fight for women's rights in Brazil as reported in the book *“Extraordinárias mulheres que revolucionaram o Brasil”* (Extraordinary women that revolutionized Brazil) by Souza and Cararo (2017). Thus, they were named: Bertha Lutz, a white, heterosexual, 36-year-old female professor; Nísia Floresta, a mixed race (*parda*), heterosexual, 53-year-old female professor; Caramuru, a white, bisexual, 30-year-old male professor; Medeiros, a white, heterosexual, 45-year-old, male professor; Portinho, a white, heterosexual, 39-year-old, male professor; and Antonieta de Barros, a white, heterosexual, 53-year-old, female professor.

The interview was divided into eight moments of dialogue with the professors. The discourses presented in this article appeared in the **sixth moment**, when we showed those professors some fragments of scientific descriptions that were criticized by feminist studies. The professors were asked to read each of the fragments and then report their impressions.

The first fragment was an excerpt of the research developed by Gerald Schatten and Heide Schatten (1983, p. 31-32), addressing human fertilization, which describes the spermatozoid “harpooning” aggressively the egg and the mechanisms involved in this process:

Scanning electron microscopy had shown that the sperm and egg first touch when, from the tip of the sperm's triangular head, along, thin filament shoots out and harpoons the egg. Remarkably, the harpoon is not so much fired as assembled at great speed molecule by molecule, from a pool of protein stored in a specialized region called the acrosome. The filament might grow as much as twenty times longer than the sperm head itself before its tip reaches the egg, and sticks.

In the historical construction of fertilization, gametes were stereotyped and humanized, and a romance was built up around these cells (Martin, 1991), in which the spermatozoid is the protagonist in the process, while the egg's active role is ignored (Keller, 2006; Schiebinger, 2001).

The second fragment presented a short summary of the research called "*Human Tears Contain a Chemosignal*" (Gelstein *et al.*, 2011), published in the *Science* journal, which addressed the chemical signaling function of human emotional tears:

Researchers at the Weizmann Institute of Sciences reported that "emotional tearing is a poorly understood behavior that is considered uniquely human. In mice, tears serve as a chemosignal. We therefore hypothesized that human tears may similarly serve a chemosignaling function", those authors investigated three adult women who donated "sad/negative" tears and 24 men who participated sniffing those women tears. The men had not seen the women crying and were not informed what they had been sniffing. In that investigation, the researchers concluded that women's emotional tears contained a chemosignal that reduced sexual arousal and testosterone levels in men.

The article by Gelstein *et al.* (2011) is another scientific discourse that reinforces culturally, socially, and historically built stereotypes of passive and sentimental women. In addition, it strengthens testosterone discourses in men's behavior.

The third and fourth fragments were descriptions of the sexual selection content, one is an excerpt from Darwin's book (2014) and the other was extracted from Dawkins's book (2001):

[...] male alligators have been described as fighting, bellowing, and whirling round, like Indians in a war-dance, for the possession of the females; male salmon have been observed fighting all day long; male stag-beetles sometimes bear wounds from the huge mandibles of other males; the males of certain hymenopterous insects have been frequently seen [...], fighting for a particular female who sits by, an apparently unconcerned beholder of the struggle, and then retires with the conqueror.[...] (Darwin, 2014, p. 118).

Philanderer males lose patience quickly if a female will not copulate with them straight away: they go off and look for another female; after copulation too they do not stay and act as good fathers, but go off in search of fresh females [...] (Dawkins, 2001, p.173)

The excerpts show inferences regarding male and female animal behavior at the time of reproduction/copulation. Sexism is revealed in the adjectives used by the authors to qualify the behavior of those animals, and in the male and female characteristics in the descriptions, thus humanizing them.

After the interviews, transcription was carried out and understood as discourses in a process somehow mechanical, but reflective, regarding the possibilities of analysis of that material. To manage to look into the discourses under Foucault's perspective, we revisited Foucault's workshop, as written by Veiga-Neto (2006), and there we got hold of some of Foucault's tools. Such tools were the concepts that supported our work with the discourses, in order to fragment them into smaller chunks and peep between utterances in an attempt to understand them within the power relations they were inserted.

One of the important Foucault's concepts to be used as an analysis tool is that of **power**. We borrowed from Foucault (1979) the conception that power is organized in networks and passes among individuals, thus not being centralized in one individual or institution. Both the subjects of our research and the discourses they produced are products of power relations. We understand that science is a device that produces socially authorized discourses, which articulate power and knowledge, making them circulate, for

example, through the educators' discourses since they teach science content and are also scientists. Therefore, when looking into such discourses, we sought to analyze and reflect upon power relations that they circulate and that structure the production of biology specific knowledge. This process is also guided by the feminist epistemology critique, which evidences power relations present in scientific productions.

Another tool used in Foucault's workshop is the concept of **discourse**, as a "set of utterances" originated in a given "discursive formation" (Foucault, 2008, p. 132). Such utterances set historically situated truth regimes since "discourse is the product of its era, the power and knowledge of its time" (Bordin, 2014, p. 228; Veiga-Neto, 2007). **Discourse** is also understood as a cultural representation built under certain conditions in society. Therefore, discourse builds up and regulates knowledge, determining what can or cannot be said, via inclusion/exclusion rules. Discourses also produce subjects, they say who we are, what we do, and what we are attached to, among other aspects. When we look into the truth regimes found in discursive utterances and their meanings, we can notice why some thought lines or some truths are elected, while other ways of thinking are rejected, we can see the effects of utterances and silencing in discursive acts (Carvalho, 2018).

In our analysis, we sought to understand and focus on the professors' discourse formation processes, in an attempt to answer the following questions: What made that discourse to be there, in that way, and not a different one? What are the power relations present, which at the same time reinforce and are reinforced by such discourses? What are the other discourses articulated to it?

According to Foucault, discourse has multiple meanings, but it is closely linked to the concept of utterance, another tool that we borrowed from Foucault for this analysis. **Utterance** is understood as an "act" that is part of the discursive formations, which can be only seen at the moment of the analysis, by shifting the gaze (Foucault, 2008). The concepts of discourse and utterance are linked to the concept of **discursive formation**, which constitute "groups of utterances, that is, sets of verbal performances" that "are linked at the level of *utterances*" (Foucault, 2008, p. 130-131, author's emphasis). As pointed out by Fischer (2001), discursive formation systems are always related with knowledge fields and considering our research, they are related to the science knowledge field, more specifically biology. According to Foucault (2008) and Fischer (2001), the analysis of discursive formation and utterances go hand in hand and occur simultaneously since when marking the discursive formation, the characteristics of utterances are revealed, and when utterances are described, the discursive formation is individualized. We focused on identifying the sets of utterances that we characterized as utterances that naturalize social relations from biological discourses, dichotomies that do not allow diversity, humanization of cells, molecules and animal behavior, and the science critique. We are aware that such utterances complement one another and permeate one another.

To develop the discussions, we resorted to some discussions and concepts found in the feminist epistemologies previously mentioned and that were resumed in the analyses since our objective was to analyze utterances regarding gender and power relations from the participant professors' discourses when presenting/discussing biology knowledges.

GENDER AND SCIENCE: (DIS)ORIENTED DISCURSIVE FORMATIONS

Utterances always keep a relation one to another, they are not independent, and take part in utterance series and sets (Foucault, 2008). Thus, while analyzing, we were concerned with the relations that they established one to another, from the theoretical gaze of feminist epistemologies. We marked the discursive formation to reveal the characteristics of utterances and, when describing the utterances, we individualized the discursive formation.

Naturalizing social relations from biological discourses

Naturalizing social relations from biological discourses is a historical construction already denounced by several feminist biologists (Fausto-Sterling, 2002; Haraway, 1995; Keller, 2006), in which women and

men are placed in distinct and unequal positions. It is necessary to question such discourses since for being originated in an “authoritative” and privileged place such as that of professors, they reinforce truth regimes.

When reading the excerpt presented in the interview (Schatten & Schatten, 1983), Bertha’s discourse enunciates the machismo found in descriptions of that time. She mentions:

I can see that this is a description from 1983 and we have changed this a lot, this has already been changed in books [...] this description, nowadays, it is not like that anymore, you know? It changed a lot [...]. Then, well, from the date, I imagine that [...] in (19)83 [...], surely, this issue was much stronger, you know, differences, than it is today. This does not mean it does not exist today, but I think that we have seen great change, but more change is needed³ (Bertha).

Such discourses, despite the professor’s denial, are in circulation. For example, textbook analysis in the biology area has shown that the active role of the egg is rarely contemplated in those books (Swiech *et al.*, 2019). In addition, videos found on YouTube portray the fecundation process in a stereotyped way, gametes as women and men, for instance (Nettleton, 2015). The same occurs in other educational materials made available on the education digital platform of the state of Paraná, to be used by teachers (Ferreira & Heerdt, 2020). Those studies are counter discourses to the idea that such unequal descriptions are something from the past, and that “do not exist today”, as reported by Bertha.

Portinho uses an analogy that disseminates machismo, when he says that female animals (and women) are more “selective”, more “expensive” since they ovulate once a month, and therefore, do not have several partners:

[...] this even explains why women in general, not women, but female beings in general, are more selective than men. I even joke, you see, that... the man’s sperm is very cheap, isn’t it? And what limits men, for example, male beings, in general, regarding reproduction is their limited access to females. And what limits women from having several..., is exactly the fact that they ovulate once a month only. Then, I use the analogy that men are cheap, while women are much more expensive [...] (our emphasis) (Portinho).

Such discourse situates monogamy as a female/women’s biological aspect. However, the definitions of ideal behavior, the way relationships and sexualities are lived are historically built discourses according to the imposed culture. On the other hand, the discourse naturalizes the idea that male animals (and men) do not have this alleged “selectivity”, and thus, are seen as naturally polygamic, “stallions”, for producing a larger number of gametes, and, therefore, their limited access to females is the only obstacle to their continuous reproduction.

The (re)production of such discourses of selective female/women in science is discussed by Angela Saini (2018, p. 121), who exemplifies it with articles that present the same discourse as Portinho’s, which ascribe the quality of monogamy to women and that of polygamy to men: “men are naturally polygamic and are only fighting against nature when they undertake long-standing relationships. Women are monogamic and always seek the perfect partner”. In scientific discourses presented throughout history and defended by scientists such as Charles Darwin, narratives are found that reinforce “[...] men in indiscriminate search for any woman, so that they increase their chances of generating the highest number of children; while women try to avoid undesirable male attention and seek to find the most qualified father for their offspring” (Saini, 2018, p. 121). Discourses like these articulate with the “expensive women and cheap men” analogy uttered by Portinho. Thus, joining the biological and social discourses, among others, ends up supporting power relations that reinforce women as “naturally” maternal and faithful and men driven by polygamy toward sexual practices.

Under the perspective of Portinho’s discourse, he agrees with the unequal narratives of fertilization and applies them when describing other types of behavior: “*I think that ecologically, in terms of evolution, this difference between the spermatozoid and the egg, in fact, reflects all types of behavior in the animal kingdom*”, reinforcing passive female and active male behavior. Discourses are constituted into practices (Foucault, 2008) and build up subjects, thus, it is important to question and reflect upon what kind of subjects and practices such discourses about female and male, women and men, have been built up in our society.

When reading and analyzing the excerpt from Gelstein *et al.* (2011), Portinho did not criticize the knowledge produced or the methodology, but reinforced the research discourse, using the hormone reduction evidenced to explain the male “self-interested” behavior:

Ok, then I think that the core of this excerpt number two is the fact that women’s tears are a chemosignal that reduces arousal in men. Well, I find it sad, because this shows that deep down men are quite self-interested. They want women, really want them for something more sexual, because if the woman is emotionally distressed [...] it kind of shows that the man is not really interested, it only reduces his sexual desire (Portinho).

Rohden (2008, p. 147) observed that there is “a perspective so radically centered on chemical messengers that many other phenomena are seen as embedded in them”. The science and biology discourses are “powerful” in the institution of truths, and to achieve that, they join other discourses, such as those in the medicine, psychology, and pharmacy areas, for example, building up a network that strengthen truth regimes, such as those that justify men’s aggressiveness and the idea of sex driven men due to the testosterone action.

A relevant reflection proposed by Tramontano (2017, p. 180) is that scientific discourses about testosterone join molecules to gender stereotypes: “it is impossible to separate the molecule-testosterone, neutral (regarding values), from the male essence-testosterone, a cultural construct, not only because there is no absolute neutrality in science, but because scientific dissemination unify both connotations”. Therefore, such discourses circulate in social, cultural, and science dissemination environments all the time, and might be accepted as the truth or rejected.

The discourses put forward reinforce the naturalization of self-interested men leaving their genes, monogamy, and passiveness to women, that is, active and polygamic men defended by biological discourses. Such utterances created by the modern science and reproduced everywhere keep distinct and unequal places for men and women.

Sexism structures science in the production processes and their products (Maffía, 2014; Schiebinger, 2001, 2008). From its origins, science considered women as objects of investigation, determining their psychological and biological characteristics, and establishing a hierarchical position to them in relation to men (Maffía, 2014). By discursive and non-discursive means, a discourse describing emotional, sentimental, and maternal women was created and reinforced by science and discourses from different areas, building up truth regimes about women and men. It is interesting to think that the stereotypes of women that the science highlighted were coincidentally used as obstacles to their access to the scientific activity (Maffía, 2014; Schiebinger, 2001).

Dichotomies, where do we find the diversity rainbow?

Keeping the dichotomies of discourses does not allow individuals to look at the world outside this axis, which is a domination axis in which, at times, whatever is taken as male is praised in detriment of the female, and at other times the opposite might occur.

The participant Caramuru presented the active spermatozoid versus passive egg relation: “*We might think here that the spermatozoid plays the active role, playing the role, doing stuff, while the egg is kind of still there, waiting everything happen, maybe*”. Such discourses are found in the history of the fertilization knowledge construction, and they have been criticized from the women entrance in science and the feminist critique to science. Keller (2006, p. 17) introduced other discourses such as the “maternal effect in fertilization”, which have described the egg’s active role since 1983. Keller (2006) observed that this discourse production was only possible because researchers investigated the egg’s action.

The participant Antonieta articulates two utterances in her discourses, she criticizes the fragment and circulates other truths; however, she still keeps dichotomies:

[...] really, the sperm puts, it puts up a projection and it is like a race, it must get there, but the situation is in fact that it needs to survive, you see? It has to survive, that is why it covers the egg as fast as possible, because around it

there are 500 others wanting the same thing, aren't there? Then here it is implied that: 'ah, the egg is there 'reach me, please', when in fact it is the opposite, 'help, I need to survive, I must get there' (author's emphasis) (Antonieta).

This participant's discourse shows stereotypes when compares the situation with a race and describes the spermatozoid as aware of its need to survive. In addition, keeps the egg's invisibility, describing the spermatozoid as the protagonist of this fertilization narrative, that is, it "competes" in a race against "500 others" and is aware that it must win it to survive. According to Tramontano (2017, p. 181), "ascribing awareness and coherent reasons to the organism is one of the greatest parables of modern biology". Whenever the egg does not appear in this description, even if it plays an active role in this process, it is not evidenced by the discourse.

At another time, when trying to describe the fertilization process in a more egalitarian way, the participants Antonieta and Bertha produce utterances in which the egg is aggressive. Antonieta states:

Well, here the author shows the spermatozoid as if it is in a rodeo, or in a party, or in the middle of the ocean. It shoots a harpoon, it stabs the egg [...]. The problem is that I know the story, and the story is not like that, see? In fact, it is the egg that hugs the spermatozoid and internalize it, almost forcing it, isn't it? (author's emphasis) (Antonieta).

The participant Bertha explains:

Actually, nowadays we know that it is not like that, don't we? Currently, we know that the egg grabs the spermatozoid, yes, the egg, then [...] in truth, the female gamete is in charge of almost everything [...]. So, the female gamete calls, and it is the whole female gamete that allows its entrance [spermatozoid] or not, then the spermatozoid might express whatever, but the situation is really commanded by the female gamete (Bertha).

The participants' discourses criticize the metaphor and description, but there is an inversion of the roles, the egg is masculinized and becomes the aggressive gamete, which almost forcefully grabs the spermatozoid. Discourses evidencing this "inversion of roles" when describing the egg's active role also appeared in other studies throughout the construction of the human fertilization knowledge (Martin, 1991).

Biology supports binarism with discourses that mark sexual differences, distinguishing hormones, chromosomes, genitals, cells, molecules, and organs, as female and male, and many times does not consider the existence of "variations in each of these physiological aspects that affect deeply the individual experience of gender and sexuality" (Fausto-Sterling, 2002, p. 62). Thus, whatever does not fit the binary structure is considered pathological or outside the norm. "The imposition of the gender norm has a social non-scientific motor" (Fausto-Sterling, 2002, p. 26).

Discourses that defy the norms of the two-sex system circulate (Fausto-Sterling, 2002) when, for example, we use the language of people who have wombs and those who have a monthly period, instead of women, this language seeks to include different bodies and genders. In the participants' discourses, however, the binary and dual idea of women that produce eggs and men producing spermatozoids is kept. This discourse fixes and universalizes bodies and is committed to the idea of the existence of two sexes only (Fausto-Sterling, 2002), thus it ignores the diversity rainbow.

The participant Portinho resumes again the use of hormones to justify animals' behavior:

[...] There is an interesting study, for example, showing that female lions in general, they choose male animals with longer and darker manes, because this is related to a higher testosterone level, which increases aggressiveness, so, in this case, size matters, and strength matters to defend their territory [...] (Portinho).

The participant reproduces the passive female/aggressive male dualism, with a language marked by humanization of the animals' behavior, as if the animals were aware of their "choices" and justifying aggressiveness by referring to the testosterone action. In addition, the discourse places testosterone only in male individuals, evoking the idea of "sexual hormones" observed at the beginning of the studies on these substances, which was discarded (reluctantly) later, when the presence of such hormones was admitted in female and male organisms (Saini, 2018;

Tramontano, 2017). According to Tramontano (2017, p. 180), “in practice, these hormones convert easily into one another”, and this delimitation and separation is not as strict as it appears in certain scientific discourses.

The scientific language was built up based on the men/women dichotomy and the descriptions in the biology area insistently show the action of such dichotomy always marking male and female and qualifying the formers as active and aggressive and the latter as passive and patient (Keller, 2006; Schiebinger, 2001). To “scape” gender relations we might be trapped in a situation of only praising female beings or the female portion, thus inverting male and female roles, which was seen in some of the utterances produced by the participants such as Bertha: “[...] *Couldn't it be said differently? It is the female that chooses the strongest male because she wants to guarantee that her genes will perpetuate. So [...] these two excerpts are based on the men's view, the strongest macho*”; and in Nísia's discourse:

Again, in this part of the text, the issue is clear, the male is valued, while the female is despised, but, as I said, there are many other examples [...] of the opposite, the female protagonism in the animal world and also males, not in this style (Nísia).

Both discourses criticize the descriptions and try to build up a new interpretation, but reinforce dichotomy, seeking to “solve” the sexism found in the descriptions, placing the female being as the protagonist.

The dichotomy reinforcement was also uttered by the participants Caramuru and Portinho, respectively: “[...] *Because there are many others, why not mentioning the grasshopper, for example, the female grasshopper⁴ eats the male's head after copulating, doesn't it?*”; “[...] *I gave some examples here, in the previous answers that there are several cases showing that the woman, you see, the female is empowered*” (author's emphasis). Not only does the participant Portinho reinforce dichotomy, but he also directs a humanized gaze towards the animals, when describing the female as “empowered”, an adjective that is characteristic of the historical, social, and cultural context we live in, where “women's empowering” discourses circulate. In addition, the female being is displaced from a position of passiveness to a position of aggressiveness, as in the example given by Caramuru, the discourses convey the message that there are female beings that present “macho” behavior.

The participant Portinho builds up a discourse that reinforces sexism and the stereotypes of passive female and aggressive male by humanizing animal behavior and presenting other examples that are not aligned to the feminist critique:

Because, in general, in the animal kingdom, just like Darwin mentions here, females remain there just watching, and the male ones, the troglodyte, fight and their heads, even sometimes killing each other to...to choose a female (Portinho).

In his discourse, machos are placed in nature as “troglodyte” fighting and killing each other for the female, while she keeps “watching” the scene as the final prize to be given to the winning macho. Foucault (2008, p. 55) treats discourses as “practices that systematically form the objects of which they speak” thus such discourses might justify male aggressiveness and violence and placing women under the influence of this type of behavior, which naturalizes violence against women/female beings, reinforcing their subordination role as the prize of a conquer.

The participants' discourses reproduce the exchange of subjects, according to Harding (1993), this is not the objective of feminist investigations, that is, to substitute a truth that praises men/male and their deeds with a history of women/female and their deeds. Both are considered damaging constructions, keeping this men/women or male/female dichotomy when describing the world ignores other possibilities of knowledge and interpretation as observed by Roughgarden (2004), that is, a rainbow of possibilities.

Humanizing cells and molecules, is that necessary?

The participant Nísia recalls the “harpoon” metaphor presented in the interview excerpt (Schatten & Schatten, 1983), and utters the position in which the use of this metaphor places gametes: “*This is horrible,*

isn't it? It sounds as if the spermatozoid is hmmm, I don't know, a hunter [...] as if it holds this harpoon, this thing, and hunts the target, that is the egg, as if it is a target". The participant notices that the language ascribes other meanings to the excerpt, the metaphor used describes the aggressiveness of the spermatozoid, and produces another metaphor, which is the egg as a "target". In agreement with Martin (1991, p. 7), we also question: "Why don't we call it 'building up a bridge' or 'throwing a rope' instead of shooting a harpoon? Harpoons stab the prays and injure or kill them, while the filament only attaches to the egg".

Portinho, when reading the human fertilization excerpt, builds up an acritical discourse and reinforces stereotypes, by mentioning other biology examples:

[...] and then, the female has to deal with the situation while the male walks away [...] and when you look into some species that are monogamic, let's say the parrot, for example, those that keep as a couple and, in theory, remain together until death, anyway, we know that some DNA tests have shown that many male beings are betrayed by their partners, you see? They have offspring with other male parrots [...] (author's emphasis) (Portinho).

This participant's discourse ascribes behaviors and stereotypes that reflect sociocultural values such as the maternal female that "has to deal with the situation", while the male partner goes away without bringing up the offspring, and male parrots that brought up offspring of other male animals after their partners cheated on them. This reflects the social and cultural construct around monogamy and polygamy. Such humanization in the language used aligns the animal behavior to the human society standards based on western values, and the social and cultural human organization at the biological and natural level, as if animals were aware of this type of behavior.

Bertha recognizes cultural characteristics being ascribed to animals and points out the historical context as a factor influencing such description:

[...] first, 'Philanderer males lose patience'. Does the species know what patience is? [...] two things called my attention: the way it was written in a humanized style and evoking human male feelings, that is, men's feelings. A biological description in which you can clearly see that a man is describing, and quite humanized, that is, a description with [...] feelings, human and sexist values. But then, [...] I think that at Charles Darwin's time [...] it was like that, quite extreme, you see? But I think they should change these writings' wording for our time (Bertha).

Feminist epistemologies defend localized knowledge such as Haraway (1995), which is seen in Bertha's discourse when commenting on the scientist's context. Saini (2018, p. 27) highlighted that Darwin: "...who was a man of his time. His traditional opinions about women's place in society not only guide his scientific work, but also those of many other biologists of that era", confirming the role of the social context of each scientist in shaping their posture in relation to women. The participant's discourse emphasizes the knowledge production context, but is not free from criticism and queries regarding the language used, recognizing the sexism observed in the descriptions, and uttering the need for a change when she says "they should change these writings' wording for our time".

Caroline Kennard and Eliza Burt Gamble expressed their position against Darwin's and other evolutionist scientists' ideas, at that time, but most of their critique was ignored, as pointed out by Saini (2018, p. 32) "it is difficult to visualize the directions that science could have taken if, on those crucial days when Charles Darwin was developing his evolution theories, the society were not as sexist as it was". While "currently" we still live in such sexist and prejudiced societies, there are also resistance discourses circulating with more prominence, and there is the surveillance from different feminist movements that promote resistance to power centers.

The participant Caramuru stated:

This is again the thing about a charmer man and the woman that wants to be charmed, and the use of animal examples to explain how natural this is, right? [...] you may get several fragments that interest you and create a narrative from them, I think that people do that a lot in biology [...]. So, I think that you can [...] try to use some of these little examples that serve your purpose and the part that does not interest you, you can throw away and try to naturalize things that happen in gender relations, which are not natural, which are social constructions, can't you? (Caramuru).

The discourse points to the naturalization of gender social relations which might happen when some “*little examples*” are used. The participant refers to Darwin; however, this is not a mere example, conversely, he is considered by many the “father of biology”, and the knowledge produced by that scientist held (and still holds) a truth power and have influenced a lot of other knowledge. This discourse does not problematize the presence of such knowledge in sciences, since other examples could be used by the professors or scientists, thus ignoring the effects that this specific discourse has produced from the time it started to circulate and that it still produces, which naturalizes and creates gender relations.

Metaphors used by Darwin (2014) and Dawkins (2001), such as charmers, good fathers, patience, conquer, and lack of concern are mechanisms that, through language, reinforce social and cultural stereotypes of men and women, naturalizing them. Saini (2018, p. 28) emphasized that the context in which Darwin’s theories were developed was sexist, the discourse of women being inferior beings was accepted as the truth, “when this type of prejudice and evolution biology got together, the result was a particularly toxic mixture that poisoned the scientific research for decades”, not only do they appear in the knowledge produced by Darwin, but also in the production of many other scientists.

In another discourse put forward by Portinho, the subjectivism exchange is linked to other utterances, in which aggressive and masculine females appear “*cheating*” on their male partners:

Yes, once I saw a great documentary about the penguin march, and it showed that when it is the reproductive season [...] and there are a lot more females than males, the females literally fight one to another to dispute the male animal they are interested in, then the game is inverted. The male penguin stays there as a good fridge penguin waiting and watching the two female animals fight so that he mates with the one that survive the fight (author’s emphasis).

At another point in the discourse, he states:

[...] I think the name of this bird is Jaçanã, a species that keeps a different role, that is, the female bird mates with several different males, and the male birds are the ones taking care of the eggs, and that’s okay, the male bird accepts it, you see? And then the ecological explanation to that is that it is better be cheated and stay here taking care of the offspring, in a safe habitat, [...] and seeing her there copulating with other male birds (author’s emphasis) (Portinho).

These discourses show that when females of any species are put in a relation of power, they are ascribed characteristics which are considered masculine, such as aggressiveness. Regarding the male penguin behaving as a “good fridge penguin” means that it plays roles socially ascribed to the female of the species, that is, passiveness and waiting for things to happen. In the discourse, animals are described as if they were aware of such actions: females “fighting” to dispute the male animal, the male individual waiting for the female that will win the dispute, and the male bird that accepts “cheating” from the female partner and takes care of the offspring to enjoy a safe habitat.

The discourse of aggressive male and passive female animals was/is recurring in biology, and was also seen, for example, in the primatology area briefly explored by Schiebinger (2001). That author observed that mainly in the period preceding the World War II, discourses in that area tended to reinforce stereotypes of “alpha” males, which were aggressive and dominant, and female individuals exclusively dedicated to maternity, who were seen as “sweet, non-competitive creatures, who traded sex and reproduction for protection and food” (Schiebinger, 2001, p. 244). Such discourses articulate with that produced by Portinho:

One example I love to give in class, which always provokes a lot of discussion, I mean, nice discussion, is the example of our closest relatives, you see? Chimpanzees, bonobos, chimpanzees are really sexist, that alpha macho thing, several female partners, if the partner does not want to mate, there is even a kind of rape, and when the alpha macho suspects that an offspring is not his, he goes there and commits feminic...[femicide], that is, hmm, infanticide (author’s emphasis) (Portinho).

This discourse evidences the ways through which, by using our language we ascribe meaning to the behavior of other animals, which they “not even imagine”, such as a ‘super sexist’ chimpanzee, rapist, and the whole narrative built up in the discourse.

The participant Antonieta reinforces the humanized descriptions of animal behavior in her discourse:

This is what we really see in biology, animals acting like animals, and then we notice that this unstoppable search for the species survival. [...] what I see here is what really, naturally occurs. There is the fight, yes, in my opinion the observation of the origin of species happens every day, at least in the animal kingdom, maybe not in human society, because human society works in a different way (author’s emphasis) (Antonieta).

In another excerpt, the participant stated: “*look, philanderer males, aren’t they? Then, put those animals in their place, they must be philanderers, they must call the female partner’s attention*”. In this discourse, the participant reinforces the humanized adjectives that were used in the descriptions, such as “*philanderers*”, as the animals’ “natural” behavior. In addition, she disregards that these descriptions are human interpretations, put forward by scientists, when she states that this is “*what we really see in biology*”, also uttering a decontextualized type of science. The biology discourses show such a naturalized language regarding male and female that this ends up unnoticed, but, on the other hand, when gender discussions are the agenda, this gaze can be directed to the descriptions, as seen in Antonieta’s speech since there are moments in which she criticizes the descriptions.

Schiebinger (2001, p. 274) highlighted that when we pay attention to the ways we use language and employ metaphors, “we might critically judge the images that structure our understanding of nature”. Metaphors are sometimes used, mainly by us, educators, with the purpose of facilitating the understanding of whatever we are teaching. However, it is necessary to be careful since ‘metaphors are not innocent devices used to spice the texts’ (Schiebinger, 2001, p. 274-275), they convey meanings and trigger discursive and non-discursive effects.

The participant Medeiros built up the following discourse:

I, particularly, do not like when you use adjectives or interpretations trying to humanize the situation [...]. But I think that in biology, we must understand the behavior as it is, as raw as it gets, without trying to extrapolate to human society, because it might sound like something else. Then, when you humanize an answer [...] you might distort what it means in biological terms (Medeiros).

The participant criticizes the adjectives used in the description, but her discourse evidences the (illusory) possibility of developing a “pure”, neutral knowledge that would provide understanding of a phenomenon “*as it is, as raw as it gets*”. This is the type of discourse that ignores the social character of science as a human construction, which is also composed of the scientists’ interpretations. They might seek some surveillance, some care, to avoid resorting to stereotypes when producing such knowledge, but, even so, this is not a “raw” understanding of natural phenomena. It will be an interpretation, a discourse built up by scientists who speak from their situation, knowledge is situated and, therefore, partial (Haraway, 1995).

The participant Antonieta proposed another discourse:

[...] In fact, there they humanized that animal’s attitude. They are humanizing, ‘lost patience’, ‘no longer wanted to wait for the female’. In fact, this is because they did not match, he might not have enough hormones, he might not have exhaled enough hormone and thus did not call the female animal’s attention, the female could have had her attention drawn by another male individual (Antonieta).

Such construction of a new discourse, evidenced by the participant, is related to the constructive role of the feminist epistemology (Longino, 1997), which does not criticize knowledge only, but allows the construction of new discourses reaffirming and circulating other truths. Her discourse criticizes the humanization of that behavior and thinks of other possibilities, such as the hormone action in the interaction between the animals during courtship and reproduction, it seeks to interpret the animals’ behavior without ascribing social stereotypes, not placing male and female animals as men and women in opposition.

Beyond agreement, a critical look into science

The utterances presented were built up when the participants read and analyzed the excerpt of Gelsein *et al.* (2011) article on the effects of female tears on the testosterone levels in men's bodies.

The participant Nísia criticized the research sampling and results:

This is impressive, isn't it? This type of study [...]. That is, here it shows that they used three adult women and 24 men, there is a discrepancy in the sample already, then, I wouldn't believe in this type of study. So, to show that men are not excited by women that cry and are fragile, there is a signal there [...] a type of reductionism that is unfavorable to the female gender (Nísia).

The discourse questions the knowledge produced and points out the stereotype of fragile women, which is reinforced by the research when ascribing a chemosignal to the biology of human beings. For having been published in a widely known scientific journal (*Science*), the research discourse enjoys a privileged position in a powerful and reliable place, even so the participant states that “*I wouldn't believe this type of study*” for the sample discrepancy and the female reductionism practiced.

The participant Bertha referred to the article source, which was described just below the excerpt: “*The thing here is that it's from Science, isn't it? [laugh] I will look for this study and check the total context because I found it a bit biased*”. Her discourse emphasizes the reliability ascribed to the scientific journal, which provokes that many times biased and sexist studies go unnoticed to most critical looks and reinforce stereotypes and sexism even more intensely due to power and knowledge relations.

The participant Antonieta, adds to the criticism to the sample discrepancy, and also criticizes the homogeneity of the female being reinforced by the research methodology, she says:

[...] what calls my attention here is that they included 24 men and 3 women in the study, three donors. Why were there only three women? Should we think that women are so homogenous? Being a woman is as homogenous as that? Guys, there are women of all kinds [...] this 'n' issue in the work really calls my attention and it seems to me a quite sexist 'n'. Women are all the same, let's get three then? How old are these three? [...] what kind of activity do they develop? Which phase of their period were they in when this was sampled? Then, it is as if it did not matter [...] (Antonieta).

The participant reflects upon the multiplicity of being women, moving from a discourse that understands women as a universal category to one that evokes other categories of women. The discourse this participant builds up also evidences the importance of a situated gaze as researcher and woman that she directs to the research.

The participant Caramuru articulates the research results to the social stereotype of fragile women and aggressive men, and the fact that this aggressiveness is ascribed to the testosterone hormone:

The thing of making a woman cry and say that [...] these tears reduce the man's testosterone levels, as if it made the man less aggressive [...] that thing of woman's frailty and that the man, [...], it seems that there is a trend to explain everything that men do based on the testosterone. Then it is, it is like... a free pass to do all kinds of shitty behavior [...] (Caramuru).

This discourse articulates with others historically built, which place in the hormones, more specifically testosterone, the base of men's virility, strength, and heterosexuality. Rohden (2008, p. 134) highlighted “the idea that hormones determine everything, even our intelligence and our behavior in relation to the opposite sex, seems to gain more and more followers”. Thus, using hormones to explain men's and women's behavior is a recurrent discourse in science, one that has appeared since the beginning of studies on hormones.

Tramontano (2017) explained that when ascribing the basis of differences between men and women to hormones, these molecules were gendered, the action of the so-called male and female sexual hormones starts to be understood according to social characteristics ascribed to women and men, “testosterone effects are fast and incisive, determining the aggressiveness and practicality ascribed to men, while estrogen acts more discre-

tely and with less visibility, simulating the female passiveness and kindness” (Tramontano, 2017, p. 167). Saini (2018, p. 34) discussed the association of hormones to behavior and exemplified with an article published in 1930, in which men that were subjected to hormonal treatment with testosterone reported feeling more vigorous and energetic, this type of discourse reinforced the idea that testosterone was linked to characteristics ascribed to men such as “aggressiveness, physical strength, superior intellect, and virility”. Research developed with women and the said female hormones also reinforced stereotypes of femininity, indicating that, due to the action of such hormones, women acted with greater sensitiveness and passiveness (Saini, 2018).

The science critique led feminist epistemologist to denounce prejudiced knowledge and opened ways for the construction of new truths. The critical gaze and discourse by educators that are knowledge mediators, and by researchers that speak from an authority position, become acts of resistance with potential to destabilize discriminating structures that support and are supported by scientific discourses.

FINAL CONSIDERATIONS

Throughout the research, we sought to analyze utterances related to gender and power relations found in the professors’ discourses regarding some biology knowledge, given them meaning from feminist epistemologies. The six participants reinforced discourses that naturalize social relations from biology knowledge, discourses that keep dichotomies and silence diversity, and discourses humanizing cells and molecules. However, discourses criticizing science and resisting to distinct oppression means were also uttered.

The discourse naturalizing social relations from the biology knowledge is confirmed, for example, when explaining hormones and gametes, in which stereotypes of monogamy and passivity were associated with female behavior, and polygamy and proactivity were related to men’s behavior, as well as self-interested men perpetuating their genes. Such discourses ascribe distinct places to men and women.

Discourses keeping dichotomies are confirmed and the diversity rainbow is silenced, mainly when reaffirming the norms of the two-sex system as fixed and universal. In such discourses, variations and complexities of bodies, organs, and cells that deeply affect the individual experience of gender and sexuality are disregarded, thus silencing human’s and other animals’ diversity. They also build up a discourse that dislocates the female to behaviors considered masculine such as going from a passiveness position to the aggressiveness status, but still keeping the idea of dichotomy.

Another discourse that was reinforced is that humanizing cells, molecules, and animals, among others, which is aligned to western social and cultural standards, by using language such as philanderers, good parents, patience, conquer, lack of concern, maternal feeling, being cheated, as if animals were aware of such behavior. These discourses support power structures, produce effects that naturalize social relations from biological discourses, and create gender relations.

We also observed the circulation of some critical discourses and those of resistance to this type of science, that is, the reinforcement of science feminist epistemologies and research that is presented as situated, in which research methodologies and results are not neutral, but rather influenced by the social and cultural context of its developers.

Science owns a “powerful” discourse in the institution of truths, and this power supporting the scientific discourse makes it circulate and be taken as truth, many times, without a critical view. Scientific discourses are then put together with other discourses that end up contributing to the maintenance of the sexist and heteronormative social organization. When the individual discourses of educators circulate publicly, they start to be part of the collective discourse, which allows the recognition and identification by many other educators.

Among the possibilities of biology and science research and teaching, we can think of the feminist epistemology discourses in sciences and feminist studies that are based on a situated discourse considering

historical, political, and cultural contexts accounting for intersectionalities such as gender, race, sexuality, and class, among others. When promoting the circulation of such discourses, we create the possibility of questioning what is considered natural and defend that science and teaching can be built up from different positions. What is said or not in research and teaching is influenced by power and knowledge relations, which evidence some discourses in detriment of others. We, educators, and researchers, when evidencing other truths, confront these power relations. Thus, we can circulate new discourses that open rather than close possibilities regarding both teachers' education and curricula, so that the prejudiced language still found in biology and biology teaching can be deconstructed.

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Data Availability Statements

The entire dataset supporting the results of this study was published in the article itself. According to the approval of the project by the ethics committee, only the research authors will have access to the collected data.

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NOTES

1 Our choice of the expression ‘giving meaning’ occurred after our reading of the text by Maria Lúcia Wortmann (2002), which proposes that while analyzing we ascribe meaning to discourses based on the theoretical background that supports it. Such meanings might be different when interpreted by other researchers supported by a different theoretical background.

2 We opted for the concept of detour borrowed from Bujes (2002) to elucidate that we intend to go through paths that do not lead to certainties, but they are rather detours that motivate us to think different, question, and break the supposed linearity of a study.

3 We used *italics* to emphasize the excerpts of the participants’ discourse transcripts and make them outstand in the article.

4 The insect that has this behavior is popularly known as praying mantis.

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