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Gender, body and sexuality: analysis of a teaching project based on historical-critical pedagogy and STS education

Gênero, corpo e sexualidade: análise de um projeto de ensino a partir da pedagogia histórico-crítica e da educação CTS

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Abstract: This text aims to analyze a teaching project on the themes Gender, Body and Sexuality (GBS). The analysis used Science, Technology and Society (STS), and Historical-Critical Pedagogy as references, using Historical and Dialectical Materialism as a method. Findings indicate coherence in the alignment of these references as a path to Education for GBS, historically and socially referenced, considering: relations with countryside, religiosity, and patriarchy in the experienced context by recipients; the selection of essential contents in favor of understanding human beings in their historical and social relationships; and direction of pedagogical purposes and mediations developed by professors aiming at understanding the essence of the phenomena from the perspective of *praxis*.

Keywords: sexuality education. STS education. Historical-Critical Pedagogy. science teaching.

Resumo: Objetivamos analisar um projeto de ensino sobre as temáticas Gênero, Corpo e Sexualidade (GCS). A análise foi referenciada pela Educação Ciência, Tecnologia e Sociedade (CTS) e Pedagogia Histórico-Crítica (PHC), tendo como método o Materialismo Histórico e Dialético. Os principais resultados indicam a coerência no alinhamento destes referenciais como caminho para a Educação para GCS, centrada histórica e socialmente, considerando: as relações com o campo, a religiosidade e o patriarcado, no contexto vivenciado pelos destinatários; a seleção de conteúdos essenciais, em prol da compreensão das categorias GCS no ser humano em suas relações históricas e sociais; e, o direcionamento das finalidades pedagógicas e mediações desenvolvidas pelos/as docentes, visando à compreensão da essência dos fenômenos na perspectiva da *práxis*.

Palavras-chave: educação para a sexualidade. educação CTS. Pedagogia Histórico-Crítica. ensino de Ciências Naturais.

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Introduction

Gender, body and sexuality (GBS) are categories of human beings built on biophysical nature basis from interaction between subjects and their cultures throughout the historical process. Unlike other animals, in human beings, ontological dimension is inextricably linked to the intentional transformation of the human-nature relationship. In other words, human beings not only adapt to the environment, but also modify it, create tools, transform nature, and in doing so, under certain circumstances, transform their own conditions of existence, their thinking and the products of their thinking (Marx & Engels, 2019).

According to Souza et al. (2020), under the influence of the capitalist mode of production, of class society and consequently of the alienation produced by this same system, individuals move away from concrete reality and from humankind. Therefore, it is necessary that everyone, in social collectives, intentionally develops an understanding of the historical-social conception of being human, understanding that biological factors, although relevant, do not directly and exclusively determine our development. This understanding demands specific pedagogical actions.

Historical-Critical Pedagogy (HCP) states that it is school's role identifying the most developed forms of objective knowledge, convert it into school knowledge and promote the necessary means for its appropriation by students, as well as understanding the knowledge production process and possible transformations (Saviani, 2011). Thereby, historically established as the dominant space of education, the school provides access to elaborated and systematized knowledge (Saviani, 2019), enabling cultural and human development in general (Saviani, 2011).

In that regard, the analysis of situations of educational practices on GBS offers concreteness, favoring the understanding of the circumstances in which they develop, revealing the intentionality that underpins the proposal, and guiding future actions through the production of knowledge. Accordingly, we took as study object a teaching project developed under the coordination of the first author, between 2015 and 2021, in a *campus* of *Instituto Federal de Ensino*, in the first years of Integrated High School in Agriculture, Environment and Information Technology.

According to Marx (2020a), the path to obtaining scientific knowledge is only possible through understanding the multiple relationships, contradictions and determinations of a singular phenomenon in its historical process, considering transformations, connections, and universal objective conditions. We understand that

one of the possible ways to understand the multiple determinations involved in the GBS Teaching Project was to look at its pedagogical dimension considering STS education and HCP as theoretical references based on Historical and Dialectical Materialism.

Brief History of Education for Sexuality in Brazil

History of Education for Sexuality in Brazil was conceived at the beginning of the 20th century, based on a medical-hygienist logic and Catholic-Christian morality (Ribeiro, 2013). Then, the first discussions on inclusion in the school curriculum aimed to control sexually transmitted infections (STIs), the fight against masturbation, as well as preparing women to be mothers and wives.

Between 1940 and 1960, Education for Sexuality was controlled by the Catholic Church, which considered this to be the role of the family. It is therefore unusual to find records of practices on this topic in schools during that period (Ribeiro, 2013). Attempts to systematize Education for Sexuality in schools in the 1960s were interrupted by the 1964 coup, marked by repression and religious moralism.

In the 1970s, the debate restarted and was motivated by the easing of censorship and by feminist movements, combined with advances in medicine in population control, with the contraceptive pill, and in the fight against STIs. However, according to Figueiró (1996), it was only from 1980 onwards that Sex Education began to be understood, in literature, as a political activity, with possibility of generating social transformations. The author did not reveal, though, what the content or objective of these transformations would be, that is, whether they intended to better adapt socially to dominant interests, or whether they sought, in fact, a praxis about perception of reality and collective improvement of living conditions for all people.

Between the 1980s and 1990s, with the main objective being the fight against AIDS and unwanted teenage pregnancy, several sexual orientation initiatives and projects have emerged in schools (Ribeiro, 2013). Education for Sexuality, as a public educational policy, it only occurred at the end of the 20th century, in the National Curricular Parameters – PCNs in its Portuguese acronym (MEC, 1997), through transversality. According to Silva (2015), transversal approach is problematic, as it depends on development of specific projects, which would not necessarily prioritize content that is essential for understanding human history in its

social relations, such as the socio-historical conception of the body, sexuality, reproduction, the construction of gender and its link with the social division of labor. This document reduces the importance of the content on sexuality, by affirming the impossibility of any objective truth, understanding that “as a component of subjectivity, sexuality is constructed and modified throughout life” (MEC, 1997, p. 335).

Regarding the definition of sexuality in PCNs, Silva (2015) considers it vague, imprecise, and based on psychoanalytic conception of psychosexual development, which inverts the understanding of reality by assuming sexuality as historically preceding human culture. According to the author, PCNs do not include historical aspects related to the social construction of genders, approaching an attitudinal perspective, allied to interests of the dominant class.

The historical and educational situation that follows PCNs, including the Common National Curricular Base (BNCC in its Portuguese acronym), makes GBS Education policies even more problematic. Under the influence of Christian religious fundamentalism and the hegemonic conservatism of the right wing, reactionary movements, such as the School without a Party, gain strength (Senate Bill number 193/2016), which claims to defend a neutral education. In 2014, the National Education Plan – PNE in its Portuguese acronym (MEC, 2015) was approved after any mention of the words sexuality and gender was removed from educational documents, also vetoing discussions on gender identity.

Considering this brief history of public educational policies for GBS in Brazil, it is important to place it in a broader context, that of the history of society, or of the class struggle, with oppressors and oppressed in constant opposition (Marx; Engels, 2015). Education for GBS also suffers the influences of this struggle, and hence, of the interests by oppressor class, which today is the bourgeoisie. According to Biondi (2018), the free enjoyment of gender identities and sexual orientations goes against heterosexist bourgeois standards, which exclusively defend traditional nuclear families because they depend on them for reproduction, ensuring the replacement of productive workforce and expansion of consumption. Therefore, ideological control, used to maintain the subservience of the working class, is not limited to the workplace, exerting influence even on sexual intimacy (Biondi, 2018).

This control is also reflected in the way in which GBS topics are still normally addressed in schools, as abstract content, focused on the formation of moral and hygienic values, prevention of STIs, contraceptive methods and the health/disease relationship, disregarding social, historical and cultural dimensions (Altmann, 2009;

Silva, 2015). This perspective is also made official by BNCC (MEC, 2018), which addresses sexuality limited to biological issues, silences gender issues and focuses on health and quality of life, dealing superficially with human rights (Sartori, 2022). Furthermore, BNCC considers the formation of values from an individual perspective, restricted to development of socio-emotional skills and competencies, for adaptation to the current socioeconomic and political system (Silva & Rosa, 2020).

Thereby, bourgeois values have been a guiding reference for educational thoughts and conduct (Silva & Rosa, 2020), even though teachers and students may not necessarily be aware of this. This reproduction of the dominant logic reinforces situations of injustice and social inequality (Reis, 2016), further triggering prejudices and discrimination based on class, ethnicity, gender, and sexual orientation (Abramovay et al. 2009). Thus, without a critical analysis of a totality of social relations involving GBS, school tends to be a "space for (re)producing standardized subjects, based on white, masculine, cisgender, and heterosexual representations with the consequent stigmatization and discrimination of LGBT[1]" (Souza et al. 2020, p. 372).

Accordingly, it is not enough to simply introduce the themes into official documents, or even into educational practices. The approach to GBS issues in schools needs to be conscious, intentional and theoretically based, seeking to reveal the multiple contradictions that permeate them.

STS Education and HCP: A Way to Approach GBS Relationships

According to Teixeira (2003), HCP and STS Education are theoretical references that can enable, in schools, Science teaching oriented towards democratization of systematized knowledge, as an instrument for understanding historical reality in its multiple interrelations with technology and society, with the aim at confronting situations of social injustice. This perspective reflects the political and social origin of STS Education, which is established based on the challenge to the role that science and technology play in the capitalist system (Levin et al. 2024).

Porto (2014) also indicates possibilities for aligning the references of STS Education and HCP, giving centrality to teaching that provides students with opportunity to acquire the knowledge necessary to construct a realistic image of

[1] Currently the nomenclature has been expanded to **LGBTQIAPN+**, contemplating people: **L**esbians, **G**ays, **B**issexuals, **T**ransexuals and travestites, **Q**ueer, **I**ntersex, **A**ssexuals, **P**ansexuals, **N**on-binary, in addition to the mathematical symbol + to other possibilities that can still be understood in human relations.

Science and Technology (S&T). This translates into providing access to indispensable elements so that they can consider these human endeavors and their complexities, the values incorporated implicitly or explicitly, the social, economic and political contexts in which processes and products are developed, having praxis as the horizon. Considering the many meanings that the term praxis assumes dialectically throughout history, it is important to highlight that we are referring to transformative action, as Marx summarizes in the Theses on Feuerbach (Marx, 2020b).

When dealing with GBS issues in Science Teaching, both works based on HCP references (Silva, 2015; Souza et al. 2020), as those that use STS Education (Fernandes et al., 2021; Lima & Siqueira, 2013), indicate that the approach to these themes is generally restricted to specific contents of Science and Biology. This stance may limit the deepening of scientific and technological knowledge that permeates them in their inseparable links and relations with cultural, social, political, and economic issues.

Therefore, we seek alternatives that contribute to an integrated GBS approach, which allow us to identify contradictions and strategies that the ruling class uses to conceal the essence, basing teaching on "[...] democratic and emancipatory principles, articulated with popular interests [...]" (Teixeira, 2003, p. 179). According to Fernandes and colleagues (2021), it is possible to identify convergences between Education for Sexuality and STS Education, considering a perspective of "[...] social and evaluative aspects of scientific and technological knowledge, in a contextualized way [...]" (p. 3).

Regarding the STS triad approach, Santos (2001) makes a categorization based on the importance attributed to each of its elements: ***i)*** **Sts**, proposals that emphasize scientific aspects; ***ii)*** **sTs**, those that highlight technology; and ***iii)*** **stS**, those that focus on social aspects. According to Strieder (2012), when taken in isolation, scientific, technological and social content does not adequately reflect the complexity of STS interrelationships. However, the articulation of the triad elements is rarely effectively considered in works that develop practices based on the references of STS Education (Strieder, 2012).

In addition to the adequate articulation of the elements of the triad, Strieder (2012) points out the importance of breaking with historical constructions of scientific and technological activity, which Auler (2002) calls myths of S&T neutrality, namely: ***i)*** technocracy, considers that only experts should decide on issues related to S&T; ***ii)*** technological determinism, understands that scientific and technological

development is irreversible and necessarily implies social development; and ***iii)*** salvationism, understands that humanity's problems will be solved through technological and scientific advances.

We argue that understanding all these elements may contribute both to a better understanding of S&T as a human endeavor and to appropriation of aspects of social reality, as defended by HCP. Regarding pedagogical dimension of educational work, it is necessary to situate the purposes of teaching, contents, forms materialized in actions, considerations in relation to the recipients, and the objective conditions in which educational practices are developed, as suggested by Marsiglia et al. (2019), when explaining the content-form-recipient triad, systematized by Martins (2013).

For Pires and Messeder Neto (2022), the content-form-recipient triad is the expression of how HCP materializes elements to think about pedagogical praxis. This justifies the use of this triad to structure the exposition of the categories in this work.

Theoretical and Methodological Aspects

Historical and Dialectical Materialism is the theoretical-methodological framework adopted to favor the understanding and explanation of phenomena, as they occurred in practice (Martins & Lavoura, 2018). This choice seeks to capture the movement of the situation under analysis, i.e., the GBS Teaching Project and its determinations. Educational actions and intentions of the aforementioned project will be mediations for abstracting the singularities learned and manifested by the participants, inserted in the general context understood by the systematized knowledge on these themes (GBS), within the scope of social class relations, i.e., universality.

In this methodological perspective, knowledge is the result of work by historically situated subjects, committed to abstractly decoding concrete reality in its real movement by overcoming appearance (Martins & Lavoura, 2018). To obtain the data, we used several instruments, such as records and reports of each version of the project, which were registered in standard institutional forms (available at Electronic Information System – SEI, in its Portuguese acronym); activity guidance scripts for students (GBS Project digital archives); students' textual productions (GBS Project collection available in the library); in addition to the descriptive memorial developed by the project's coordinating teacher (first author's personal archive).

After successive readings of these documents, defined as the research corpus, we carried out the procedures indicated by Martins and Lavoura (2018), that

is the formulation of a primary synthesis of the analysis material; unveiling the fundamental relationships learned in data on the investigated phenomenon; differentiation and comparative analysis of guiding ideas among themselves; and finally, the synthesis.

Then, categories of analysis that emerged from the data, based on the references, were: ***i)*** Education for GBS and relations with the field, religiosity and patriarchy, in the context experienced by the recipients; ***ii)*** Essential content for understanding GBS relationships: selection and appropriations by recipients; and ***iii)*** Ways of educating for a socio-historical understanding of human relations: understandings based on the GBS Project methodology. Although we recognize the inseparability between content, form and recipient, the exposure in separate categories favors the didactic presentation of the results.

Considering the different versions of the project, we made a cut for the analysis including only the editions from the years 2017, 2018 and 2019. The year 2015 was not selected because it offered a still incipient proposal, limited only to the subject Biology. The years 2016, 2020 and 2021 were disregarded due to exceptional circumstances (student and teacher strike in protest because of the Constitutional Amendment Project on spending in 2016; Covid-19 pandemic), resulting in an adaptation to a more restricted version of the proposal.

It is worth highlighting that the research results from the analysis of an institutional teaching project, developed on the campus where the first author works. The project is registered in the institution's project system and operates in accordance with the ethical principles of research in education. All participants in the research (students aged 14 to 20), including their guardians during parent meetings, were informed about the teaching objectives and research action, as well as the possibility of withdrawing consent at any time. It is also worth noting that the texts analyzed are the result of collective productions by groups of students, and there is no evidence that would allow individual identification. Furthermore, the participants and their guardians gave consent for the dissemination of the materials produced, both at the annual event that takes place on campus, with participation of the school community, and to make the materials that were used for the analyses available in the library and are hence for public consultation.

Considering the delimited cut, the works of 65 groups were analyzed, 24 in 2017 (G1 to G24); 16 in 2018 (G25 to G40); and 25 in 2019 (G41 to G65). Each group consisted of four to six students. In order not to identify the groups of research participants, the data were coded numerically.

In a brief project summary, we highlight common aspects of the three editions analyzed. The project had the participation of teachers from the following areas/subjects: ***i)*** specific techniques for each course, such as Zootechnics, Environmental Management, Software and Applications; ***ii)*** Human Sciences (History, Geography, Philosophy and Sociology); ***iii)*** Natural Sciences (Biology and Chemistry); ***iv)*** Languages (Portuguese Language, Literature, Physical Education, Arts and English); and ***v)*** Mathematics; as well as technical/administrative staff from the institution's Health and Education areas. As for the students, the 1st year classes of Integrated High School always participated directly.

In general, the activities were developed throughout each year in the second semester, involving the selection of study topics by the students themselves. Gathered in groups, they were guided by one of the participating employees to collect data, develop readings, studies and collective discussions. The activity of systematizing and evaluating studies occurred through the procedural production of collective texts in different textual genres, organized in a magazine for each class. The students presented their productions to the school community at an event.

Although the standard project registration form did not have space for detailing the theoretical basis, it made explicit the use of STS Education references, without mentioning a pedagogical theory that would support the proposal.

GBS Education and Relations with the Field, Religiosity and Patriarchy in the Context of the Recipients

It is important to begin this journey by highlighting that the project's recipients are concrete subjects, who, in addition to their apparent interests and needs, belong to the working class. They seek quality education in Integrated Secondary Education and Professional Training, which demands the appropriation, by students, of historically produced knowledge, from an individual and collective perspective, establishing relationships between work, science, culture, technology and society (Ferreti, 2008).

According to Pires and Messeder Neto (2022), understanding the recipients as concrete individuals does not mean cutting off the students' singularities, but also understanding their universalities, experienced by the group of human beings in a historical moment structured socially by the capitalist mode of production. This perspective is not clearly shown in the intentions of the GBS Project, which only indicates, in each version, the number of students in each of the three technical

courses offered by the institution (Agriculture, Environment and Information Technology). Even in educational practices developed based on HCP references, it is common to find this type of erasure of recipients, translated into a general and superficial approach, which does not allow for their singularities to be encompassed. Despite this erasure, it is possible to identify, in the GBS Project, the intentional creation of higher needs, which go beyond the singular daily life of the students and favor their psychic development (Anjos, 2018).

Regarding necessary adaptations to specific needs of the recipients, there is an educational intentionality in the Project, related to the integration of specific technical areas of each course, seeking to overcome the structural duality that promotes the split between intellectual and manual dimensions (Ferreti, 2008), by separation of technical subjects and the common national base. This integration is further strengthened by the intention to address scientific and technological aspects in their interrelations with social reality, which is explicitly indicated in the three versions of the project, in line with the STS Education references that underpin the proposal. The search for transformation and social participation, and the critical understanding of S&T, are part of the educational objectives frequently present in STS Education proposals (Porto, 2014). In that regard, it is possible to find clues about the intentions directed at recipients, by recognizing how S&T influences society, and is also influenced by it.

Considering the absence of more unique elements in relation to the recipients, we will look for aspects of the location where they live, establishing a relationship with the themes discussed and aspects of universality.

The campus where the GBS Project was developed is in a city in the Northwest of Minas Gerais, with an estimated population of 17,850 inhabitants (IBGE, 2021), 38.6% of them living in rural area (IBGE, 2010). According to Batista (2015), this is a place that has historically been characterized by mining, large extensive livestock farms and disputes over land, and expropriation of farms and settlements, in *coronelismo*[2] relations. The fight for land through agrarian reform is a characteristic feature of the Landless Workers' Movement (MST in its Portuguese acronym), which seeks to build a collective identity through demands and ensuring rights. For Duarte, Doula and Silva (2020), MST, since the creation of the then LGBT

[2] In the Brazilian historical context, it refers to a system of local political power, where coronels (regional leaders) controlled elections and resources, establishing relationships of dependence with the population through favors and votes.

collective, in 2014, it began to legitimize and collaborate with the struggles of the LGBTQIAPN+ Movement.

According to Batista (2015), MST's activities in the municipality were restricted to the initial stages of settlements, in the mid-2000s. Even though the author has signaled influences of "ideological and guiding action of MST, whether in the occupation, in protest movements and in the fight for a specific model of education" (Batista, 2015, p. 62), she identifies a distancing among the settlers in relation to the alternative pedagogical model proposed by MST. This lack of interest is perceived, according to the author, by the educational aspirations of parents and students, focused on the challenges of the job market.

In addition to these contradictions, we were unable to identify the organization and/or demonstrations of the LGBTQIAPN+ Movement in the region. In the GBS Project records, there is no mention of a locally organized social movement of an identity nature. Whenever the LGBTQIAPN+ Movement is mentioned in the productions of the participating students, the reference is to the Brazilian context. None of the data analyzed points to a perception of the relationship between MST and LGBTQIAPN+ Movement or reports the context of the municipality hosting the Project.

Regarding current local, productive relations are centered on corporate agriculture for grain production, livestock farming and family farming, demonstrating the strong link that the city still maintains with the countryside (Batista, 2015). For Lorenzoni (2007), elements that generate violence in gender context and class relations are intensified by the current sociopolitical-economic structure, especially in rural areas. We also did not identify data that indicate intentionality of approaching these relationships in educational actions of GBS Project and consequently are not reflected in understanding by majority of participating students.

However, descriptive memorial presents the report of G51, formed only by female members, who made a presentation on aspects of machismo in the professional field of agriculture. They were discredited by a small group of students and a rural landowner who visited the exhibition, who did not recognize the existence of gender differences in the social division of labor. According to Costa and Bezerra Neto (2022), the practice of denying aspects of reality and making discussions about GBS topics in schools offensive is common and aims to silence and prevent knowledge about Education for Sexuality. Thus, the need for education in the aspect of gender and human sexuality is denied.

Texts by Batista (2015) and by Morais e Morais (2017) highlight some contradictions related to socioeconomic and cultural aspects of surroundings of the campus where the recipients study. The agribusiness field is marked both by significant revenues, mainly for the large companies that operate there, and by many difficulties for families seeking to extract subsistence from the land. This context is reflected in the municipality's social inequalities and in the incipient development of trade and services sector to meet the basic needs of residents. Artistic manifestations of groups and customs of local origin are exalted, especially when linked to Christian religiosity, a striking characteristic in the region.

At the same time, devaluation of the rural world in the urban space is evident, as observed, for example, in the prejudice suffered by settled students (Batista, 2015). The very model of professional and technological training proposed for the Federal Educational Institution, established in the municipality since 2010, seems to "reify a supposed agricultural and/or agro export 'vocation' for the region served (Batista, 2020, p. 274) (author's emphasis)".

Problematic understandings of these complex social relations and differences, in both rural and urban contexts, can be exemplified by the excerpt from G6: *"there were notable changes in family bases, given the country industrialization and migration of masses to urban centers. This meant that families stopped being predominantly rural and organized in a patriarchal form, closed in on themselves, and began to open a little more to life in society"* (Excerpt from G6 texts). If, on the one hand, the recipients recognize links between work and society and the strength of patriarchal social relations in rural areas, on the other hand, they demonstrate an understanding that these are broken down in urban centers, which does not represent reality. Even though women's struggle has granted them some rights today, patriarchy continues to prevail, both in rural and urban environments, in the latter, sometimes in a veiled way. The continuity of sexual division of labor, for instance, is one of the essential tools for maintaining the current socioeconomic model (Silva & Silva, 2022).

The absence in GBS Project of problematization of these contradictions of social relations in rural and urban contexts, experienced by the recipients, corroborates that statement by Batista (2020), demonstrating the importance of adopting a theoretical framework, such as HCP, which would provide support for considering aspects of concrete social practice in educational actions. It would also contribute to the discussion of the social impacts of S&T, aiming at a critical understanding of reality and its transformation, through concrete intervention actions,

as proposed by Strieder (2012), in the purpose of STS Education for Development of Social Commitments.

Descriptive memorial records for the years 2018 and 2019 demonstrate relationships between the religious influence, which is prominent in the municipality, and GBS themes. Some participating servers proposed the study of sexuality from the Bible, in defense of principles and interests of Christian morality. The project coordinator needed to reinforce the principles of secular education, thus demonstrating the educational intention of GBS Project in breaking with the Christian religious bias in interpretation of sexuality. Costa and Bezerra Neto (2022) state that, especially in Brazil, interference of religious social groups in practical implementation of sexual education in schools is striking, to direct and/or invalidate them. According to the authors, these groups are guided by defense of heteronormativity as the only socially acceptable model, despite the multiplicity of possibilities of sexual orientation, gender identity and family groups among human beings.

The relationship between Christian religiosity and patterns of sexual orientation and gender has been indicated in some texts. However, this recognition was still in the realm of appearance, since the majority did not establish relations between this interference and the broader social, economic and political context. G63, for example, indicated the “church’s” opposition to any type of orientation other than heterosexual, without mentioning which church they were referring to. Contradictorily, they also expressed the understanding that homophobia results from individual and unfounded behavior, as can be identified in the sentence: *“people follow their ‘ideologies’ by spreading* ***gratuitous hatred****, and at extreme levels, reaching physical and verbal violence”* (Excerpt from G63 texts – our emphasis).

At the same time, G28 recognized that the conservative view on gender identity finds support in “*the values employed by Christianity, one of the foundations of Western culture*” (Extracted from G28 texts). However, G28 does not delve into reflections of this relationship, demonstrating that they have not reached an understanding of the reasons for this social model based on bourgeois and religious morality, as Costa and Bezerra Neto (2022) point out.

Thereby, we highlight general elements about the recipients and some particularities about the place where they live, their economic, cultural, social aspects and their relations with the educational institution. In summary, we indicate that educational intentions of GBS Project were not considered: ***i)*** recipients’ singularities, as concrete subjects; ***ii)*** the dominant mode of rural production in the region and its devaluation; ***iii)*** the dispute over land and its relations with social movements; and ***iv)***

relationships between local socioeconomic inequalities, sexual division of labor and the class struggle.

Essential Contents for Understanding GBS Relationships: Selection and Appropriations by Recipients

As stated in the introduction, HCP values systematized content. According to Messeder Neto (2022), this defense does not mean holding back on those contents taught by tradition, commonly found in textbooks, which are insufficient for the level of awareness that allows us to understand and transform reality. It is therefore necessary

> take global social practice as a reference and extract from it, which elements are central for the subject to understand the world beyond appearances, so that he/she can see what is hidden in the opacity of everyday life and know the most developed thing that humanity has ever built (Messeder Neto, 2022, p. 276-277).

Social practice, a central aspect in organization of pedagogical processes, must be understood in its historical and contradictory process, linked to the forms of production in society today, overcoming the daily lives and experiences of students (Massi et al. 2022). Therefore, “It is not a question of linking or relating this knowledge to ‘society’ or the ‘environment’ but understanding that this knowledge only exists in human social practice with its contradictions” (Messeder Neto, 2022, p. 278).

With this understanding, we sought the justification that GBS Project brought for the choice of central themes, which in the three versions analyzed, was based on three points: ***i)*** official curriculum documents; ***ii)*** importance of this knowledge for “construction of autonomy and the life project of children and adolescents” (Extracted from Projects – 2018 and 2019); and ***iii)*** neglect and prejudiced, dogmatic and normative treatment given to GBS in everyday life and also in the school environment.

The use of official curricular documents as the main guides in choosing content in Science Teaching, based on HCP, was observed by Pires and Messeder Neto (2022). The authors also warned against appropriation of hegemonic discourses from these documents, emphasizing common sense, relativism and individual subjectivity. Then, the three points of justification for GBS Project are supported by official documents and need to be rethought based on social practice

and concrete needs of recipients. This rethinking would direct the choice of content and educational intentions towards a synthetic understanding of human relations in their broader social connections, which would also allow for an understanding of reasons why GBS are neglected and treated in a dogmatic, hygienic and normative way. In Other words, the third justification presented in the project for the choice of content is a consequence of socially constituted ideological constructions, which need to be unveiled.

This, the justification for the choice lies in the very understanding of GBS as historically determined categories, which would offer “a qualitative leap in relationship between the individual and society, allowing to understand and unveil heteronormativity and its consequences, especially with regard to the social marginalization of LGBT[QIAPN+] people” (Souza et al. 2020, p. 377) (our addition).

Regarding essential contents, Silva (2015), also referenced by HCP, indicates the search for understanding human history in its social relations, which involve mastering knowledge about “[...] the human body, sexual/reproductive system, contraceptive methods, ways of contracting diseases, including STDs, ways of avoiding them, the historical-social conception of the human being, encompassing the social construction of genders [...]” (p. 84).

This knowledge, identified by the author as essential content, was the direct target of the Project’s educational intentionality in the versions analyzed (2017, 2018 and 2019). Project reports explicitly show concern not only with classic disciplinary content from Natural Sciences, Human Sciences, Mathematics, Languages and technical areas, but also in situating them in relation to the demystification of standards; understanding of how scientific and technological knowledge is produced and disseminated in its entirety; interpretation and writing of popular science texts; and appropriation of body’s biological functioning, which is done culturally and historically in social relations.

It is worth analyzing whether the recipients of educational actions were able to take control of the most developed school content as instruments for understanding reality, as indicated by Marsiglia et al. (2019). Therefore, it was possible to infer different degrees of appropriation of the knowledge addressed in the GBS Project. Most of the groups (46 out of 65) presented themselves in the immediate appearance of demonstrations, establishing only generic relationships, such as heteronormativity and religion, patriarchy and gender division, abortion and criminalization, aesthetics and media, without deepening or identifying other elements and interests that permeate these issues. We illustrate with G28, when it states that questions about

the body and aesthetics *"involve physical, emotional and mental factors, which are constituted by historical, cultural, social, individual and biological influences"* (Excerpt from G28 texts), but does not delve into the aspects or mention relationships indicating understanding the meaning of these influences, which end up being socially secondary due to the perspective of biological scientism prevailing in GBS.

Despite the Project's intention to direct consideration of GBS in its social, scientific and technological relations, two groups (G12 and G24) sought to justify sexual orientation and/or gender identity exclusively through biological determinations, linked to genetic origin. According to Dinis (2008), the search for biological genesis of sexuality and gender identity relations, for example, through research that looks for genes that define sexual orientation, run the risk that naturalization will be limited to policies of tolerance, of respect for differences, which do not change the *status quo*. According to the author, this would contribute to the maintenance of socially established patterns of heteronormativity determined by bourgeois/religious morality.

It was possible to identify several groups (19 of 65) that went beyond the immediate appearance of the phenomena studied, demonstrating incorporation of scientific school content situated in historical, social and political practice. G56, for instance, historicized the issues of Gender and Sexuality by revisiting aspects of Colonial Brazil, discussing the influence of patriarchal values and European Christian religiosity in the formation of the country. Within this context, discussed sexual division of labor and sexual exploitation mainly of enslaved indigenous and black women, highlighting aspects of intersectionality (social class, gender, race) in understanding our mixed-race population. Another example is G42, when places historical influences of Brazil, as European colony, in establishment of media standards of beauty, which in capitalist society are exclusively focused on profit, directing towards an ideological mediation that confuses *"health and beauty, linking the consumerism of products to the search for the perfect and socially standardized body"* (Excerpt from G42 texts).

These groups, which come closer to the essence of the phenomena, reveal multiple determinations that involve the contents they address, but on the other hand, they also locate possibilities for transforming reality. G63, for instance, recognizes the cultural and religious influence on hatred propagated towards the LGBTQIAPN+ community, but at the same time sees the possibility of changes in culture through humanization, acceptance and respect for all individuals.

It was possible to observe, in the 65 groups, signaling the need to transform unjust, violent and prejudiced social practices, demonstrating absence of conformity with reality. For 46 groups, this transformation is in an individual perspective of opposing or favorable positions, based on beliefs, values and purposes of each one, without establishing a broader relationship on how the forms of capitalist production are decisive in construction of these values and beliefs. Understanding that change is located on an individual level is illustrated in the excerpt taken from the G30, which discussed the risks of hormonal pollution[3]: "*people need to be more aware of what pollution is doing to humans and other animals."*

However, 19 groups, when highlighting the need to transform practices, also situate themselves in collective aspects, discussing the impacts of consumerism, forms of labor exploitation, inequalities, relations with hegemonic interests, historical aspects, the importance of socializing technologies, among others. In that regard, they do not attribute to individuals in isolation the responsibility for changes, which although necessary, are insufficient if exploitative logic, based on profit and income concentration, is maintained.

Project reports and scripts produced to guide students indicate the intention of considering scientific, social and technological aspects that involve the content covered, in line with the references of STS Education. The analysis of these elements allowed the creation of Table 1, indicating the way in which the contents related to Science, Technology and Society were approached by the students, as well as the interrelations between STS, when these were present.

Table 1: STS relationships highlighted by students

Concepts Covered	Total	STS Relations	Interrelationships between STS
S-S	33	5	Relationship between early life, religion, culture and abortion (G54) Social Relevance of Science (G24) Perception of Science as a human production, subject to interests and values (G17) Impacts of Science on Society and the Environment (G20 and G64)
S-T	3	1	Endorsement of Technicality and Salvationism (G18)
STS (integrated triad approach)	1	1	Relationship between access to S&T and social classes (G48) Production and use of S&T to reduce social

[3] Related to endocrine disruptors in the environment.

			vulnerabilities (G48)
StS (emphasis on science and society)	14	7	Impacts of S&T on society (G9) Limits of S&T (G12 nd G27) Relationship between access to S&T and social classes (G46 and G47) Influence of social class and culture on the consumption of S&T (G49)
STs (emphasis on science and technology)	2	1	Relationships between technologies and risks (G4)
sTS (emphasis on technology and society)	2	1	S&T benefits, harms and possibilities (G43)
Sts (emphasis only on science)	3	1	Relationship between access to S&T and social classes (G62)
sTs (emphasis only on technology)	1	1	Research funding interests (G3) Endorsement of Determinism (G3) Benefits, harms and possibilities of technology (G3)
ctS (emphasis on society)	4	1	Ethical aspects of reproductive technologies (G61) Relationship between access to S&T and social classes (G61)
cts (superficial approach to the three elements of triad)	2	0	-

Note: Produced by the authors from data analyzed

We expanded the classification initially proposed by Santos (2001) to encompass the different emphases observed in participants' textual productions. Then, most of the works (47 out of 65) emphasize the approach of scientific and social aspects, with 33 of them not even mentioning technology. Oliveira, Guimarães and Lorenzetti (2016) show that, in general, among the elements of triad, technology is the least prominent. These authors indicate the importance of educational actions favoring the understanding of technology as a human enterprise, whose knowledge relates technical and sociocultural aspects. This understanding goes beyond that indicated by G43, which addresses technology in a way that is limited to uses and risks associated with sexting (the practice of sending erotic and sensual content via cell phones).

However, G48 could establish a good relationship between the elements of triad when considering different aspects related to AIDS. This group reports, for example, how scientific and technological knowledge, in the production process, could be used to improve living conditions and protect women in vulnerable situations in Africa. However, the group indicates that this would require equal access for people to S&T resources. As this does not occur in concrete reality for all human beings, the group pointed out the need to review public policies for democratization of S&T.

Classification aimed at demonstrating, in students' productions, the mentions of STS in their interrelations. Issues such as the content covered and limits on size of texts did not always favor an adequate exploration of the elements of triad by the students. However, works with a superficial approach to the triad and persistence of myths regarding S&T (Auler, 2002) in the students' final productions reveal aspects that deserved to have been identified and better explored in educational actions of GBS Project. G18, when listing the ethical risks of In Vitro Fertilization, assesses that these are guided by scientific knowledge, which must define the best way to proceed, as can be seen in the excerpt: *"[...] the risks are real, it means we need to boost scientific knowledge of ethical issues to determine what is right and what is wrong"* (Excerpt from G18 texts). In addition, G18 considers Science as sufficient to resolve any issue, indicating a Salvationist and Technocratic perspective.

In G3 works is possible to observe that, on the one hand, they recognize the importance of directing scientific discoveries to meet "expectations of a society anxious to avoid diseases and evils that affect health or invariably have an impact on people's quality of life*"* (Excerpt from G3 texts). At the same time, they indicate that this defense for quality of life needs to be compatible with the "*technological imperative"*. Then they demonstrate a deterministic view of technology, understanding society as submissive to technology.

In summary, we highlight fundamental elements for selection and approach of GBS content. The first one is the valorization of historically systematized knowledge, in its greatest degree of objectification that human production has allowed to date. The second is linked to the effort to lead students to make necessary abstractions to move from the appearance to the essence of phenomena to understand the multiple determinations of reality.

Ways of Educating for a Socio-historical Understanding of Human Relations: Insights from GBS Project Methodology

In the three versions of the Project (2017, 2018 and 2019), school is highlighted as an institution that favors access to content related to GBS. This appreciation of school as a dominant space for education and a better understanding of reality by students is in line with what Saviani (2011) suggests. As this author conceptualizes, it is the school's role to identify the most developed forms of this objective knowledge, converting it into school knowledge and promote necessary means for understanding not only the contents, but also of the process of production of this knowledge and possible transformations throughout historical process.

According to Pires and Messeder Neto (2022), both the way in which the content is transmitted and the pedagogical resources to be used in this process are not exclusive or characteristic of a specific pedagogical theory. For these authors, purposes, contents and recipients are what indicate the strategies to be adopted. This requires knowing theoretical and methodological foundations that support HCP to select procedures that will best favor understanding the systematized content. STS Education references also indicate multiplicity methodologies, seeking to overcome abstract practices, without connections with objective reality (Teixeira, 2003).

It can be verified that the path for students to access knowledge related to GBS was not limited to a biological and abstract perspective. Then, the proposal was designed from an interdisciplinary perspective that considered the themes in their relationships with scientific, technological, social and cultural aspects.

For Galvão, Lavoura and Martins (2019), the idea that totality is achieved through disciplinary rupture may lead to a pragmatic resolution, often present in attempts to develop interdisciplinarity in schools in a specific and forced way. Therefore, Saviani (2011) indicates a path to reach the totality of relationships without devaluing specificities of subjects, fundamental parts in moments of later synthesis. According to this author, these parts are initially seen in a chaotic way, but through mediation of analysis it is possible to achieve clarity of the whole, but this does not mean that these subjects are dissociated at some point.

In that regard, it is worth highlighting that planned interdisciplinary proposal did not occur in a one-off manner, but rather throughout an entire academic semester, resumed each year in the following editions of the GBS Project. Furthermore, specificities of subjects involved were not disregard, considering that project's employees prioritized content necessary for general understanding of subject

knowledge to detriment of the proposal for interdisciplinarity. In some groups (21 out of 65), the subject matter in the technical area of students' training was not directly linked to knowledge from other areas, but rather focused on content important to understand the specific area. An example of this occurred in G38, which discussed prostitution, but in the zootechnical curiosities, it addressed unrelated but seminal content for the area, such as artificial insemination of cattle.

Considering the link between form and content, Messeder Neto (2022) highlights the importance of systematic work to develop students' scientific forms. According to the author,

> "this implies that the teacher must use a series of pedagogical resources so that the student understands reality in a non-fetishized way, something that can only be done if the content is presented in its multiple determinations, loaded with concreteness." (p. 284).

Project records indicate that pedagogical resources were planned and developed in different phases (Table 2), which aimed at organizing actions. Then, they were not linear and stagnant processes because study, systematization and dissemination actions took place whenever necessary, at different times.

Table 2: Stages of development of educational activities of GBS Project

Stage	Intentions	Resources
1st Preparation	Presentation the Project, participating employees and their objectives, in each of the rooms General discussion of GBS themes considering specificities of subjects	"*Discussions of texts and videos, debates, questions and answers, opinion polls, construction of graphs and data analysis, expository classes, individual and group activities"* (Project Report – 2019)
2nd Theme selection	Approaching the students' reality	Selection of topics and content by the students organized into groups
3rd Development	Guided studies, systematization and procedural evaluation	Procedural activity of collective writing texts with review and assistance from supervisors
4th Disclosure	Presentation and evaluation of work for the school community	Collective magazines, organized with sections produced by the groups Organization of stands for presentation of works Participation of staff and students in the visit and evaluation of works

Note: Produced by the authors from data by GBS project

We did not find details on the use of resources in the preparation stage, nor even specific purposes of each one. However, reports and activity plans leave clues that resources were planned according to specificities of each subject to systematize content related to general GBS themes. For instance, In Biology classes, study of reproduction and formation of biological sex used resources such as expository classes, videos and animations. The indicated intentionality points to understand scientific and technological issues linked to concepts, considering social aspects associated with gender patterns throughout history, intersex people and gender identity. In mathematics classes, the analysis of scientific and popular texts was used for interpretation, reading and construction of graphs, revisiting basic concepts. Another example is reading and writing different textual genres with the purpose of identifying characteristics and intentions of each type of text in Portuguese Language classes. Despite these indications, there are no specific details on how mediations developed individually by teachers involved took place in relation to resources used, which according to Pires and Messeder Netto (2022), is essential for them to become fruitful for the students.

On the second stage (Table 2), it is worth discussing the meaning and reflections of methodological orientation of theme selection by students. Although it may appear to meet students' interests and needs, it can be problematic, because there is a risk of meeting the needs of only the empirical subject, i.e., curiosities about immediate situations that he/she experiences in his/her daily life. In HCP's understanding,

> The idea of a problem is not limited to what a group of students are interested in knowing and therefore it reveals a need. For historical-critical pedagogy, *at school*, teacher is the one who directs educational process, and is responsible for creating the reasons for learning, generating new needs for understanding reality, beyond the immediacy of everyday life and practice (Marsiglia et al. 2019, p. 16) (emphasis by the authors).

Then, according to these authors, problematization of what should be taught calls more on the cognitive sphere of teachers than on that of students. In this case, it was up to the guiding staff of each group to develop the task of directing, within the themes already chosen by students, the essential content for understanding objective reality, which does not reveal itself immediately. This guidance occurred in the third stage of the project, the development stage (Table 2).

Procedural activity of collective writing text, developed in the third stage, made it possible to systematize the studies and evaluate learning. It allowed advisors to act as more experienced partners, contributing to the formation of systematized

concepts, not limited to common sense, in a planned, systematic and intentional way, which is supported by Vygotsky (2008).

Mediations developed by advisors, associated with the Project general orientation, to consider STS relationships involved in the contents, allowed a look beyond the specificities of each subject, approaching, in many cases, the essence of the phenomena, observed by considering social, cultural, political, economic and historical determinations. They were perceived and appropriated in different ways in each group, as described in the previous section. An even more systematic work, aimed at understanding multiple determinations, may broaden instrumentalization of participating students for a more universal and totalizing understanding of STS interrelations which are in concrete reality.

The final stage, publishing the results (Table 2), included an event for the school community. According to Messeder Neto (2022), this type of educational action, involving the community, focused on citizenship formation and social participation, is commonly recognized as capable of transforming realities. However, the proposals end up focusing on maintaining the relationships of interests engendered in the capitalist system. Then, the author points to the need for students to appropriate the notion that S&T, as historical productions of humanity, resulting from human work. Therefore, they are objects of consumption of a class that holds the means of production, and expropriated force of another class, the worker, who only has its force to sell in this system, governed by the commodity. Having appropriated these relationships, community actions help to create a sense of collectivity, “but they must always be presented as activities of consciousness-raising so that the working class begins to recognize its situation as an exploited class and creates the feeling that the struggle for radical transformation is possible [...]” (Messeder Neto, 2022, p. 280).

Then, the need to equip students for praxis is highlighted, understood as an action that overcomes social structures and alienated work relations in search of alternatives that aim at dignity and humanization of all people.

Conclusions

In this work, we analyze the GBS Teaching Project using theoretical frameworks of STS Education and HCP. Through the content-form-recipient triad, we seek to understand the circumstances of development of educational practices, the intentionality that underpinned the proposal, guiding future actions.

Then, we highlight the relevance of considering universal and singular aspects of recipients, understood as concrete subjects with immediate needs. However, they are determined by class society and depend on an in-depth understanding of these determinations to seek elements of transformation of the reality.

Selection of contents must be aligned with singularities and universalities of recipients, considering fundamental aspects to reach the essence of the phenomena, which involves consideration of historical, cultural, scientific, technological, economic and social issues in their multiple, complex and veiled relationships.

Understanding the intrinsic relationship between form, content and recipients, it is worth highlighting that there is no specific or determined methodology, considering both references of STS Education and HCP. Educational purposes and mediation between methodological resources and students give teachers opportunity to direct them towards broader understandings of systematized knowledge, which occurs in social practice. In this regard, we mentioned as an example the methodological organization of GBS Project, which divided students into groups under guidance of staff members who acted as more experienced partners. This strategy provides an opportunity to identify elements needed to help students move from appearance to essence, through analysis and abstractions.

We conclude by highlighting the contribution of this work in demonstrating the coherence between the references of STS Education and HCP as a path towards Education for GBS, historically and socially referenced.

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