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THE TEXTBOOK: AN ECHO THAT LEGITIMATES GENDER STEREOTYPES IN MATHEMATICS IN THE EARLY YEARS OF ELEMENTARY SCHOOL

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Abstract: Gender issues permeate various social and educational areas, transcend specific issues, and even become a relevant aspect in relation to Sustainable Development, represented by SDG 5, which provides for gender equality and empowerment of girls and women, linked to the recognition that subjects are constituted in the relationships they establish, and that, therefore, such gender identity subjectivities need to be accepted, respected, valued and included in all contexts, including through pedagogical instruments such as books didactics, which represent one of the most used tools by the educator in the classroom. In this sense, our study consists of a qualitative research, of the documentary analysis type, carried out based on the Ápis Collection, of Mathematics, for the initial years of Elementary School, adopted by the Municipality of Campina Grande (Pb), in the academic year of 2022 to subsidize the teaching work, with the objective of analyzing the dimension given to gender issues, and the female representations that are given from the problematizations, with a view to identifying a subjective position or their silencing, in the dissemination of sexist stereotypes. However, for the most part, in the analysis of textbooks, a pattern of problematizations was observed with stereotyped associations of activities and situations based on social roles that are established based on a limited conception of biological gender, thus constituting a silencing of gender subjectivities.
Keywords: Didactic books; Mathematics; Gender; Subjectivities.

INTRODUCTION

The contemporary scenario is characterized by a subjective social formation, in its various aspects, not only in a multicultural sense, but in a multiple conception of the subject itself and of their identity constitution, of how they recognize themselves in a community structure that no longer meets the demands of binarisms that frame and hierarchize, dispensing with an expanded look at new conceptions of gender.

This way, as well as social spaces, educational spaces are constituted in this process of diversification of human subjectivities, requiring educators to be prepared to effectively welcome different subjects, giving space for them to be represented, re-signifying the old patterns that regulate male and female behaviors. women from biological aspects that are historically accepted and disseminated.

In this perspective, it is opportune to consider that the concept of gender, which we will base our analysis on, is linked to the expanded perception, which transposes biological determinism from the anatomical aspect, and in which the construction of the subject's identity, and its respective subjectivity, through social interactions, is constructed and reconstructed, based on a multiple conception of the feminine and masculine that is delineated in a diversified scope, without "the intention of denying that gender is constituted with or on sexed bodies, that is, not Biology is denied, but the social and historical construction produced on biological characteristics is deliberately emphasized." (LOURO, 1997, p.22).

Therefore, considering the importance of gender issues in the current social scenario, and the role of the Textbook in the educational field, especially as a disseminator of social "models", establishing feminine and masculine standards according to sexist stereotypes, we carried out in the present study, a documentary analysis of the Textbooks of the Ápis Collection, of Mathematics, early years of Elementary School, adopted by the Municipality of Campina Grande (PB), aiming to identify in the proposed problematizations the way in which gender issues are addressed, and the female representation that in this one

is evidenced, in order to analyze the outline of the discourses that permeate them and the commitment in the inclusion of identity subjectivities.

Because the Textbook is an instrument frequently used as a subsidy to the pedagogical practice, in which the speeches contained acquire the content of "truths", if they are not reflected by the educators, naturalizing values and attitudes considered as a reference standard of an androcentric society, in which the Masculine assumes a central position, as well as their behaviors and experiences, and the tendency to postulate the feminine at the margin and exclusion, making it necessary for educators to take a critical look at this pedagogical instrument.

This way, based on our analysis, we perceive the Textbook as a device for inclusion and exclusion, depending on the discourses contained in the form of problematizations, and on the intermediation of teachers in order to provide opportunities for the various identity representations that in fact make up the social context and the reality of students, breaking with sexist stereotypes.

GENRE: A SUBJECTIVE PERSPECTIVE OF IDENTITY

The term gender as a social and identity constitution arises from the feminist movement, which seeks in its struggle to include subjectivities that are outside the social context, and in this perspective, ""gender" becomes a way of indicating "constructions cultural" - the entirely social creation of ideas about the proper roles of men and women. It is a way of referring to the exclusively social origins of the subjective identities of men and women. (SCOTT, 1995, p.75)

This way, the issue of gender in the contemporary perspective, no longer refers to specific issues, and gains scope, as it is a reference linked to the identity of the subjects, an attempt to include those who do not feel represented in the various spaces social, in which behaviors and roles are postulated according to biological sex, defined from the anatomy of the body, according to which, Louro (1997) states that:

> Roles would basically be arbitrary standards or rules that a society establishes for its members and that define their behavior, their clothes, their ways of relating or behaving... Through learning roles, each one should know what what is considered appropriate (and inappropriate) for a man or woman in a given society, and to respond to those expectations. Although used by many, this concept can be reductive or simplistic. (p.24)

And just like the other social institutions, the School has been an environment for adapting students to such social roles, in speeches given that delimit from physical spaces to symbolic knowledge, in attributions of skills, in affinities with areas of knowledge, in a process in which "male practices are more valued and hierarchized in relation to female ones, the private world being considered of lesser importance compared to the public sphere, in the Western imagination." (RAGO, 2021, p.9)

AND DOES MATHEMATICS HAVE "GENDER"?

Mathematics has been postulated as a typically male area of knowledge, under the male domain, an aspect that, although it has no scientific basis, is associated with stereotyped gender discourses, which configure it in a rational perspective, linked to the male field, and this way:

> Taking Bourdie's concept of field (2002) as a reference, the field of mathematics is a place where actors (mathematicians) struggle around specific interests, which characterize the area. The domination of this field is guaranteed by the accumulation of

> capital (advanced mathematical knowledge) which represents a certificate of competence historically conquered and preserved by men. (apud ARAÚJO, 2018, p.47)

This conception, which between the lines assumes that some have greater ability to master mathematics and its concepts than others, starting from supposed biological characteristics, pertinent to each gender, where boys/men, considered more agile, restless, rational, would be more prone to mathematics, whereas girls/women, being calm, concentrated, emotional, would be more likely to excel in subjects such as Portuguese, in gendered discourses taken as "truths" that are naturalized in the social and educational environment, and that have an impact not only on learning mathematics, but on the choice of professions and careers linked to the area of exact sciences, because "These ideas about innate talent make fewer women participate in sciences involving mathematics, because strong stereotypes persist about who really take place in this discipline (STEELE, 2011, apud Boaler 2018, p.81)

And in this sense, there are a series of implications for the female field, since "When this elitist idea combines with stereotyped ideas about who has the gift, cruel iniquities are produced." (BOALER, 2018, p.81), ranging from the silencing of girls in the early years, with difficulties and low learning rates in mathematics, to the reduced representation in professional activities involving mathematics or STEM areas (Science, Technology, Engineering and Mathematics), as pointed out by studies published in the Unesco 2018 Report, according to which:

> Within the global student population of women in higher education, only 30% chose STEM-related fields of study (Figure 5). Differences are observed by disciplines. Female enrollments are particularly low in ICT (3%), natural sciences, mathematics and statistics (5%) and engineering, industrial production and construction (8%); the highest are in health and wellness courses (15%).

Such data show, not the inability of girls/women for STEM areas, specifically mathematics, but that some factors may be interfering in their learning process in this specific discipline and their identification with the respective area of knowledge, and among these, " gender stereotypes that convey the idea that STEM studies and careers are male-dominated can negatively affect girls' interest, engagement and performance in these areas, as well as discouraging them from pursuing STEM careers" (UNESCO, 2018, p.43)

Aspect that can compromise the development of Science and scientific investigations in this area, in which women could contribute with their subjectivities and enrich scientific productions in their various research areas, contributing effectively in the globalized context.

According to Ernest (1991) the issue of gender in mathematics, permeates broader issues, which go beyond the low performance of girls in external exams and underrepresentation due to female non-identification with the discipline, it is about consequences of Institutional sexism and Social, which delimit female spaces and postulate mathematics in discourses that place it as a male domain.

Institutional sexism would be represented by the cultural content of the curriculum, which exposes it as a masculine domain, the classificatory evaluations that stimulate competitiveness, the pedagogical instruments and texts with biases of gender stereotypes, the insufficiency of positive female models among Mathematics and the very history of the area, as well as the teaching that values individualism and selection, minimizing orality and the cooperative process in the construction of mathematical knowledge

and concepts, and the unconscious sexist positioning of some teachers, constitute measures of female silencing.

And, according to the author, sexism in society manifests itself in the process of cultural domination, which legitimizes and reproduces gender stereotypes, lined up by structural institutional sexism, which reproduces inequalities between women and men, denying these social, professional and social opportunities and equal education.

In this sense, Ernest (1991) highlights the process of exclusion of girls/women from mathematics through a cycle, which according to him begins with the lack of equal opportunities in learning mathematics, for various reasons, leading to girls' negative views about it. of their own skills in mathematics, reinforcing their perception of mathematics as a masculine subject, which triggers lower test results and participation in mathematics, which, as this subject is a "critical filter" in regulating access to higher-level occupations, leads to women to obtain jobs with lower wages, and consequently, a disproportionate positioning of women in such areas.

THE TEXTBOOK AND GENERIFIED DISCOURSES

The Textbook is one of the main tools that help teachers in teaching practice, having increased its visibility from the creation of the National Textbook Program (PNLD), through Decree nº 91.542 of 08/19/1985, which was an improvement of the (INL) Instituto Nacional do Livro, which began in 1929, whose objective was the distribution of books to public school students.

However, it was from 1996 onwards that the Ministry of Education (MEC) organized a commission composed of specialists in the various areas of knowledge, to carry out a pedagogical evaluation of the books acquired by the PNLD program, whose exclusion or rejection criteria would be the following: that "present conceptual errors, that lead to errors, that do not present theoretical-methodological coherence, that are out of date, spread discrimination or any form of prejudice, among other problems." (PEREZ, 2016, p.27)

Therefore, the commitment of the Ministry of Education to the improvement of the Textbook can be seen, since this is a resource that is widely used in the teaching and learning process of students, concerned that there is no propagation of discriminatory processes based on its content. , since the PNLD is a national program, and that, therefore, the Textbooks, "have been and continue to be constituted as powerful instruments of unification, even of national, linguistic, cultural and ideological uniformity". (CHOPPIN, 2004, apud PEREZ, 2016, p.28), reflecting positions and values considered as standards, aspects of a normative culture, which suggests conduct, and which in practice are often disconnected from the social and cultural context.

And in this sense, we will highlight the issue of gender, the focus of our research, taking mathematics textbooks as a reference for analysis, where little has been addressed, without considering its subjective and relational perspective, linked to identity, in speeches given in problematizations, that implicitly or explicitly naturalize sexist stereotypes seen as social standards of male and female conduct, present at all levels of education where Mathematics is seen as a primarily male field, and "this reality is highlighted in basic training, because in textbooks the main Theorems and procedures of mathematics pay homage to famous mathematicians, naming them after them, such as the Theorem of Thales of Miletus, the Theorem of Pythagoras, the Theorem of Fermat, the Algorithm of Euclid, the Sieve of Erastosthenes.(Bourdie 2002, apud ARAÚJO,

2018, p.47)

And this lack of disclosure of female representation related to mathematical knowledge, and its consequent inexpressiveness in the literary context that underlies teaching practice in mathematics classes, is configured as a female silencing device, validating male superiority in this area of knowledge, an aspect that although subtle, it has significant consequences, considering that:

> The problem of transmitting these ideologies through textbooks is that, in a phase between the first four grades of Elementary School, in which children are between 7 and 10 years old, a critical posture, stability and maturity are still in doubt, thus being able to condition the professional, personal and social destiny of boys and girls. LOURO, 1997, apud FERREIRA, p.47)

Therefore, as the students are in the process of building their identities, assimilating values, attitudes and positions, they end up this way, taking such postulated models in the textbook, through images and problematizations, and their respective representations of male and female while natural.

METHODOLOGY

This study will consist of qualitative research, based on document analysis, based on the assumption that "documents are all types of written material that can be used as a source of information about human behavior." (LÜDKE; ANDRÉ, 1996, apud LIMA, HARRES, PAULA. 2018, p.96) and that may provide us with an opportunity to understand the phenomenon to be studied.

In this sense, we will carry out a documentary analysis of the Mathematics Textbook, Ápis collection, adopted for the initial grades of Elementary School by the Municipality of Campina Grande, in Paraíba, with emphasis on the images and speeches presented in problem situations, with the objective of analyzing and to understand from these, the gender perspective that is evidenced, in the sense of identifying if these disseminate in their nuances, explicitly or implicitly, sexist stereotypes.

We will observe in the images and speeches present in the textbook how the image of women in the context of mathematics is evidenced, and the roles that they represent in the context of problem situations, if these are in fact consonant with the contemporary perspective in which women have entered different spaces social, or if they bring standardizing standards that reflect a stereotyped positioning of gender, which establishes social roles based on a biological conception of gender that defines and delimits the masculine and feminine BEING.

And for a better understanding, we will be theoretically based on authors such as Rago, Souza and Fonseca, Scott, Boaler, among others, in theoretical studies about gender issues in the context of mathematics and their stereotyped discourses in order to identify the impacts caused in the context of classroom by the way this aspect is addressed by textbooks and a possible dissemination of sexist roles that exclude and hierarchize subjects in the context of Mathematics.

ANALYSIS OF THE TEXTBOOKS COLLECTION

Textbooks can be considered one of the main pedagogical instruments used by teachers, especially in the early years of Elementary School, and as such, reflect the curriculum perspective on which the teaching and learning process will be based, which bring with them, explicitly or implicitly, social and political conceptions referring to gender issues and the roles linked to them.

This way, aiming to obtain a greater understanding of how gender issues are treated in the Mathematics Textbook, and because we

believe that they are capable of "legitimizing ways of being and thinking about life and the world, making them even a vehicle carrying ideological, implicit or explicit discourses" (TREVISAN; DALCIN, 2017, p.3) we chose to analyze the Ápis Mathematics Collection from 1st to 5th grade, adopted by the Municipality of Campina Grande-PB, in relation to the language contained therein , whether images or discourses in their problematizations, and the way in which they represent the feminine.

In the process of analyzing the Mathematics Books, we observed mostly images and situations "regarded" as everyday, but which reproduce a historical conception in which the girl/woman is always linked to the private space of the home and its consequent domestic and care activities , while boys/men are linked to the public space, to the context of work, sport, on rare occasions in which, throughout this collection of books from 1st to 5th grade, we verify the male figure in a domestic scenario, typically socially attributed to the feminine.

The images represent boys and girls interacting in different situations, in an apparent idea that there is an inclusion of the feminine, however, implicitly we can perceive remnants of gender stereotypes, considering that in the image entitled "the world of mathematics" the boy and the girl plays soccer, a historically male activity, however, these are differentiated by the colors on the scoreboard, where blue is for the boy and red for the girl, and although she is participating in the activity, the scoreboard suggests her lower ability in such activity sport, indirectly legitimizing that girls/women occupy male spaces, but in fact are not included, but perceived inferiorly in relation to boys/men, not being "capable" of surpassing boys in this activity, an aspect evidenced by the score , in a sexist conception in which such a link became naturalized, denying a female insertion in various spaces and social activities, which include football as a sport.

The images above show once again the stereotyped conceptions of gender, which suggest, based on a biological determinism, the roles to be played by each gender, in which men are associated with the space of professions and work, as in the image in that the man performs the role of mason, while in the problematization the woman is linked to domestic functions, such as going to the supermarket.

This way, we observe that "the textbooks, through ideology, also delimit and establish which careers are 'appropriate' for women". (FERREIRA, s/a, p.47), which gives us a dimension of how gender stereotypes interfere and determine ways of BEING a girl and a woman, harming not only the development of their skills in mathematics, but the self-confidence in exercising typically male occupations.

The figure above brings a different perspective from the majority portrayed in the Ápis de Mathematics collection, from 1st to 5th grade, in which the father finds himself in a supposedly feminine position, occupied by the mother, in a domestic context, making a cake and associated with care, breaking sexist paradigms and representing the family and social restructuring that permeates contemporaneity, in which men and women assume different roles from those modeled by a stereotyped historical conception.

We evidenced from such images that our purpose is not to establish a criticism to the author of the books, and others involved in such literary production, but to provide an opportunity to reflect on the need to bring to the classroom, to the context of mathematics, a commitment to gender equality, and recognition of the impact that sexist stereotypes play on female students' learning process and students in the initial

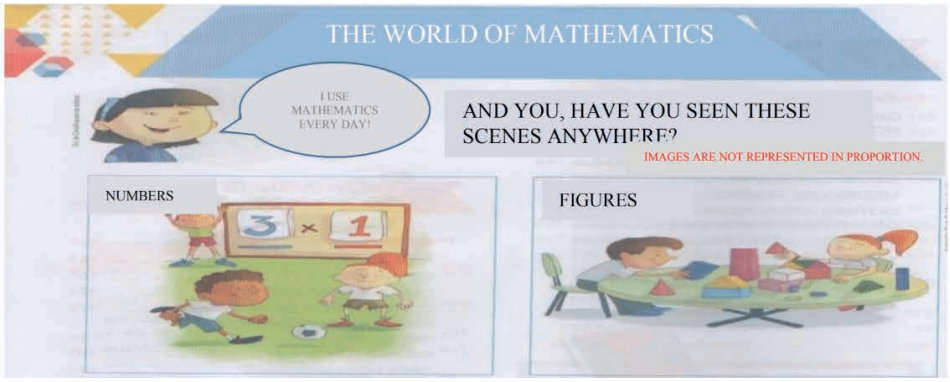

Figure 1: Illustration representing children interacting

Source: DANTE, 2017, 1st year, p.10

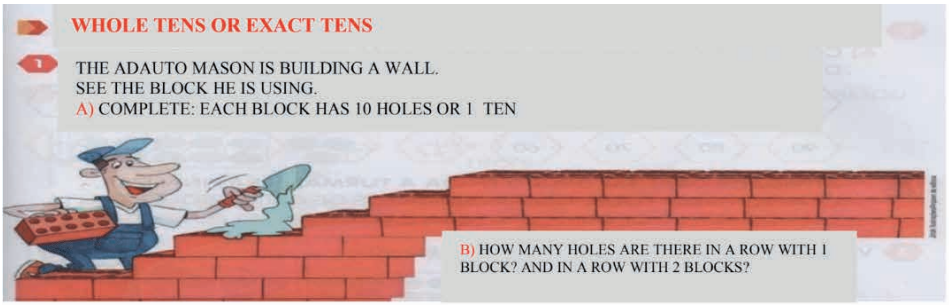

Figure 2: Illustration of a mason.

Source: DANTE, 2017, 2nd year, p.38

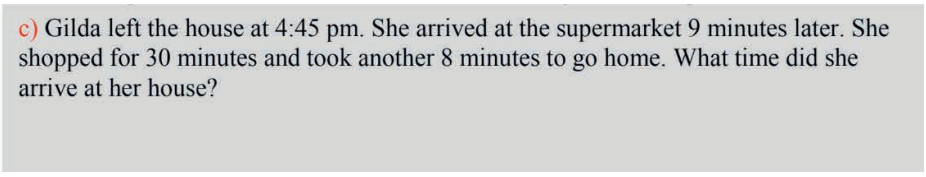

Figure 3: Problem illustration where the woman goes to the supermarket

Source: DANTE, 2017, 4th year, p.93.

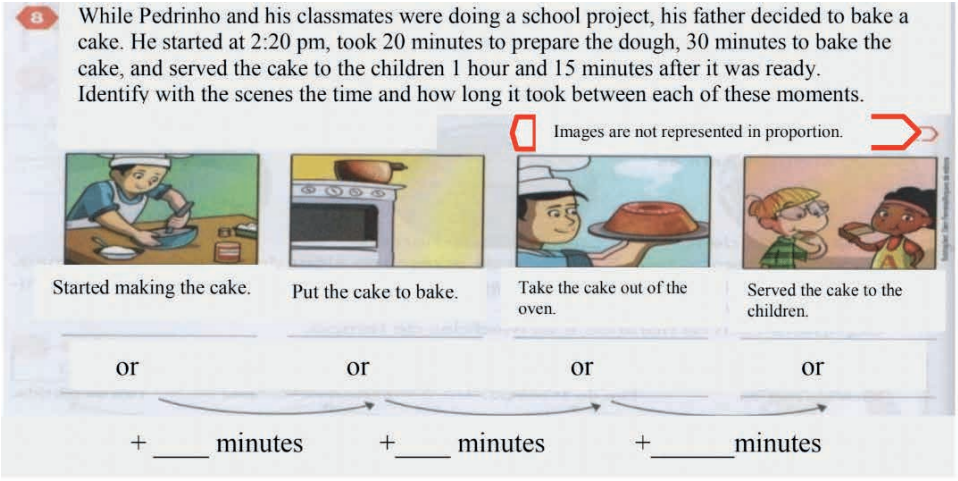

Figure 4: Illustration of a man cooking at home

Source: DANTE, 2017, 3rd year, p.104

grades of Elementary School, considering that in this age group they represent beings in development, of personality, values and attitudes, without an expanded critical formation, which helps them to assimilate the symbolic patterns evidenced in textbooks as naturalized patterns , and consequently, whatever is different, will cause estrangement and prejudice, "and thus be able to condition the professional, personal and social destiny of boys and girls." (FERREIRA, s/a, p.47)

FINAL CONSIDERATIONS

In the analysis of the books, in their images and problematizations, we noticed a dissemination of gender stereotypes, in a configuration in which the girl/woman is most often associated with the private, domestic space, in activities of seamstress, cook, florist, at the same time that boys/men are associated with the public space, sports, professional contexts such as mason, driver, and landlords, demonstrating that "textbooks convey essentially sexist content and in many aspects already outdated reality." (FERREIRA, p.47)

Therefore, the way in which the problematizations contained in the textbook are proposed, and the language used, refer to gendered elements, as they expose situations considered everyday, in which they naturalize social roles determined according to gender, and which are positioned as a standard , being anything that deviates from such models a deviation, since language, whether verbal or non-verbal, represented by images "can be considered the most effective and persistent field for establishing relationships, positions and fixing differences." (LOURO, 1997, apud FERREIRA, p.47)

Considering that the textbook has been an instrument frequently associated with the teaching and learning process by teachers across the country, and that their approach portrays a curricular perspective to be established in the classrooms, it is clear that "the curricula investigated thus work with a whole system of gendered thinking that divides, hierarchizes and confines boys and girls in certain spaces." (PARAÍSO, 2016, p.222).

This way, we conclude that educators have the responsibility of mediating such discourses present in textbooks, which, directly or indirectly, corroborate with social inequality and female exclusion, providing opportunities for reflections on the proposed mathematical problematizations, in the sense of deconstructing the stereotypes of gender, highlighting the female presence in the various social spheres, as well as their ability to perform a variety of functions considered masculine, in the sense of re-signifying gender issues, aiming at a perspective of female inclusion and human subjectivities.

REFERENCES

BOALER, Jo. **Mentalidades Matemáticas: estimulando o potencial dos estudantes por meio da matemática criativa, das mensagens inspiradoras e do ensino inovador/** Jo Boaler; tradução: Daniel Bueno; revisão técnica: Fernando Amaral Carnaúba, Isabele Veronese, Patrícia Cândido. - Porto Alegre: Penso,2018.

DANTE, Luiz Roberto. **Ápis matemática, 1º ao 5º ano: Ensino Fundamental, anos iniciais/** Luiz Roberto Dante.3 ed. São Paulo: Ática, 2017.

LIMA, Valderez Marina do Rosário; HARRES, João Batista Siqueira; PAULA, Marlúbia Corrêa de. **Caminhos da pesquisa qualitativa no campo da educação em ciências: pressupostos, abordagens e possibilidades /** organizadores Valderez Marina do Rosário Lima, João Batista Siqueira Harres, Marlúbia Corrêa de Paula. – Porto Alegre: EDIPUCRS, 2018.

Decifrar o código: educação de meninas e mulheres em ciências, tecnologia, engenharia e matemática (STEM). – Brasília: UNESCO, 2018.

FERREIRA, Márcio Porciúncula. **Currículo, Gênero e Sexualidade: Questões indispensáveis à formação docente.**

NETO, Vanessa; PINHEIRO, Weverton Ataide. **A Questão de Gênero em Livros Didáticos de Matemática: Uma comparação entre materiais do Brasil e dos Estados Unidos**. Revista de Investigação e Divulgação em Educação Matemática, Juiz de Fora, v. 5, n. 1, p.1-21, jan. – dez., e-ISSN: 2594-4673, 2021.

PARAÍSO, Marlucy Alves. **Currículo e relações de gênero: entre o que se ensina e o que se pode aprender.** Revista Linhas. Florianópolis, v. 17, n. 33, p. 206-237, jan./abr. 2016

PEREZ, Francisca Monteiro da Silva. **Análise do Livro Didático de Matemática e a sua Relação com os Gêneros Discursivos/** Francisca Monteiro da Silva Perez - Natal, 2016.

RAGO, Margareth. **Epistemologia Feminista, Gênero e História. In: Masculino, Feminino, Plural**. Orgs. Pedro Joana; Grossi, Miriam. Florianópolis: Ed. Mulheres,1998.

SCOTT, Joan. **Gênero: Uma Categoria Útil de Análise Histórica**. Revista Educação & Realidade; dezembro, 1995.

TREVISAN, Andreia Cristina Rodrigues; DALCIN, Andréia. **Um olhar sobre as questões de gênero em livros didáticos de Matemática.**2017**.**