Sociedade Brasileira de Educação Matemática

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Curricular Discussions on Mathematics Education for Social (In)Justice(s)

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Abstract: In this essay, I aim to show how the Mathematics curriculum content in basic education (re)produces social injustices, as it stems from a historical and intentional selection process following political-economic and/or political-cultural interests. Starting from a clear understanding of Social (In)Justice, mobilizing curricular discussions, I turn to two episodes inscribed in the History of Brazilian Mathematics Education to fulfill this objective. Finally, I point to what I believe to be the core of any Mathematics Education that is ultimately concerned with Social Justice issues.

Keywords: Nancy Fraser. Social Justice. Math Curriculum.

Debates Curriculares sobre la Educación Matemática para la(s) (In)Justicia(s) Social(es)

Resumen: En este ensayo, pretendo demostrar cómo los contenidos curriculares de Matemáticas en la enseñanza básica (re)producen injusticias sociales, dado que son el resultado de un proceso de selección histórico e intencional en función de intereses político-económicos y/o político-culturales. A partir de una comprensión inteligible de la (In)Justicia Social, movilizando discusiones curriculares, recurro a dos episodios de la Historia de la Educación Matemática Brasileña para cumplir ese objetivo. Finalmente, apunto a lo que creo que está en el corazón de cualquier Educación Matemática que se preocupe, en última instancia, por cuestiones de Justicia Social.

Palabras clave: Nancy Fraser. Justicia Social. Currículo de Matemáticas.

Discussões Curriculares sobre Educação Matemática para a(s) (In)Justiça(s) Social(ais)

Resumo: Neste ensaio, objetivo demonstrar como os conteúdos curriculares de Matemática da educação básica (re)produzem injustiças sociais, tendo em vista sua característica de serem frutos de um processo histórico e intencional de seleção seguindo interesses político-econômicos e/ou político-culturais. Partindo de uma compreensão inteligível de (In)Justiça Social, mobilizando discussões curriculares, recorro a dois episódios inscritos na História da Educação Matemática Brasileira para cumprir com o que objetivo. Por fim, aponto o que acredito ser o cerne de qualquer Educação Matemática que, em última instância, se preocupa com as questões de Justiça Social.

Palavras-chave: Nancy Fraser. Justiça Social. Currículo de Matemática.

1 Initial Considerations[1]

Mathematics has been a discipline since the Greeks [...]
and has been the most stable

[1] To Deise Aparecida Peralta and Antonio Ianni Segatto, my advisor and coadvisor at the doctoral studies, who inspired me to seek, with foundation, a mathematics education aimed at social justice.

form of though in the Mediterranean tradition
that has lasted to this day as a
cultural manifestation that imposes itself,
uncontested, onto other forms
– Ubiratan D'Ambrósio[2]

This is perhaps my favorite quote from all of Mathematics Education! Not only because it was written by our late Ubiratan, but because it denounces, in a direct and practical manner, a dimension of mathematical knowledge that has been contested by recent productions in the field: the social ideal of neutrality. And, from what I have noticed, discussions involving Mathematics Education and Social Justice have been one of the ways and means of contesting this idea.

In recent times we have observed an exponential growth of publications and practices in Mathematics Education concerned, above all, with Social Justice issues even if these publications and practices do not assume at times an intelligible understanding of Justice. In the Brazilian literature, Eric Gustein's (2006) works stand out as the key theoretical background in many of these publications and practices. In his productions, Gutstein levels reading and writing the world with Mathematics, based mainly on Paulo Freire's discussions about a pedagogy for Social Justice. However, as much as Gutstein's (2003a; 2003b; 2006) understanding of Social Justice has not been intelligibly stated, we can easily perceive its alignment with the classic universalist conceptualization historically defended by liberal theories of justice (Forst, 2010; Melo, 2010).

In one way or another, with an intelligible understanding of justice—or not—today's publications and practices in Mathematics Education concerned with Social Justice assume a critical look at the social ideology of a supposed neutrality intrinsic to mathematical knowledge (Taveira, 2023; 2024), described by Gelsa Knijnik (1996, p. 123) as "a conception of Mathematics linked to a rationalist tradition of thought, which sees it as a neutral science, free of value, detached from how people use it."

It is against this backdrop that this essay emerges to discuss how, historically, the Mathematics Education offered to basic education students helped to reproduce social injustices, thus emphasizing the non-neutrality of mathematical knowledge in the social reality through a curricular approach. I therefore argue that the Mathematics curriculum content in basic education (re)produces social injustices, as it stems from a historical and intentional selection process based on political-economic and/or political-cultural interests.

Methodologically, I turn to Theodor Adorno (2003, p. 25), in "The Essay as Form," for whom the essay "does not play by the rules of organized science and theory, according to which, in Spinoza's formulation, the order of things is the same as the order of ideas." As such, I seek to not fall prey to pre-established molds of publicizing knowledge, nor to limit my discussions after all, not only the content communicates, but also the form (Adorno, 2003). Understanding that the essay "presses for the reciprocal interaction of its concepts in the process of intellectual experience" (Adorno, 2003, p. 29), I shall fulfill my objective by making use of the theories, concepts and understandings that are dear to me.

To do so, I present here an understanding of Social Justice that will guide the discussions, namely, the two-dimensional understanding of Social Justice proposed and, later, developed by Nancy Fraser. Next, I bring academic discussions on Curricular Studies that will

[2] (1998, p. 10).

support the emphasis undertaken in this text, highlighting the relation between curriculum, curricular contents and formative processes. Understanding that "the essay challenges the notion that what has been produced historically is not a fit object of theory" (Adorno, 2003, p. 26), I take examples inscribed in the history of Brazilian Mathematics Education to illustrate and demonstrate my point. I conclude by pointing out what I believe to be the main task of those who discuss and/or practice Mathematics Education for Social Justice.

2 For an intelligible understanding of Social Justice

Starting from the history of Philosophy that we have been taught, at least since Plato's *The Republic*, the question of Justice is at the heart of the debates in Political Philosophy. Justice is an old but current question and, for this reason, "has to be answered each time anew—and indeed not only in respect of normative content but also with regard to the methodical justification of a philosophical theory of political and social justice" (Forst, 2010, p. 9). Since then, various thinkers have set out to investigate and reflect on justice, including the works of John Rawls (2016), Rainer Forst (2010) and Nancy Fraser (2022).

To meet the objective of this essay, I will take Nancy Fraser's discussions on Social Justice, chronologically located between the late 1990s and early 21st century, when her theorizations are described in terms of a two-dimensional theory of Justice (later reworked as a three-dimensional theory).

As I have presented on other occasions (Santos, Taveira & Peralta, 2022; Taveira, 2023; Taveira & Peralta, 2022; 2023), Nancy Fraser is an American philosopher who is affiliated with the Critical Theory of Society and, in her academic career, has theorized strongly about Feminism—specifically during the Second Wave—about Social Justice and, more recently, has theorized about contemporary Capitalism (Fraser, 2024), especially related to racial oppression, social reproduction, the ecological crisis, feminist movements and the rise of right-wing populism. Currently, Fraser is one of the most prominent thinkers of her time, with a great repercussion of her thought in Brazil and a considerable number of her theoretical works translated into Portuguese.

As I said, in this text I will discuss the two-dimensional perspective of Social Justice proposed by Fraser; however, before conceptualizing and explaining this perspective, I shall present some considerations about the philosopher's approach to the subject. For Fraser (2014, p. 267), "justice is never actually experienced directly. By contrast, we do experience injustice, and it is only through this that we form an idea of justice." In this sense, based on the assumption that "justice is the overcoming of injustice" (Fraser, 2014, p. 268), the author argues that

> the strategy of approaching justice negatively, through injustice, is powerful and productive. *Pace* Plato, we do not need to know what justice is in order to know when something is wrong. What we need, rather, is to sharpen our sense of injustice, to cut through obfuscation and ideology. Focusing on the wrong, we need to determine why it is so and how it could be made right (Fraser, 2014, p. 275).

Having characterized the Fraserian approach to Social (In)Justice, I will now explain the main concepts and understandings that make up the two-dimensional perspective of Social Justice (r)elaborated by Fraser.

Noting that "egalitarian redistributive claims have supplied the paradigm case for most theorizing about social justice for the past 150 years" (Fraser, 2002, p. 7) and that struggles for recognition have become the main banner of political struggle for groups subjected to social

injustices, Fraser (2022, p. 27) diagnoses a phenomenon that she calls the Substitution Problem, in which "cultural domination supplants class interest as the fundamental injustice," and in doing so cultural recognition displaces socioeconomic redistribution as the goal of political struggle—or as the main remedy for social injustices.

In this attempt, the demands for justice, which in the history of theorizing about social justice have had a redistributive character [Redistribution], are forgotten and replaced by demands for cultural recognition [Recognition]. For Fraser, both economic and cultural issues are essential if we are to diagnose and remedy the social injustices of our times. Thus, Fraser presents a two-dimensional theory of social justice that has become popular in the literature as Redistribution-Recognition, or, as I prefer to call it, Recognition if, and only if, Redistribution (Taveira, 2023).

Redistribution refers to the structural and material issues of social reality, with socioeconomic injustice as its basis and maldistribution as its main form of injustice, with all other redistributive injustices deriving from it, such as "exploitation [...]; economic marginalization [...]; and deprivation" (Fraser, 2022, p. 30). On the other hand, recognition refers to symbolic and cultural issues, with the injustice of recognition as its basis and false recognition as its main form of injustice, with all other recognition injustices deriving from it, such as "cultural domination [...]; the absence of recognition [...]; and disrespect" (Fraser, 2022, p. 31).

In formulating this theoretical project, Fraser therefore assumes that social justice, in order to fulfill its role in the best possible way, requires both recognition and redistribution. With this, the philosopher seeks not to equate her theoretical project to a reductionist economicism or culturalism[3]. Hence, the intelligible understanding assumed in this essay is the Fraserian understanding that social justice requires us to look at economic and/or cultural issues, especially in a post-socialist era. According to Melo (2023, pp. 106-107), for Fraser the term 'post-socialism' "alludes to both an earlier moment in the progressive imagination and practice (the context of socialism) and a later moment (after socialism), even if it does so in the sense of an inconclusive reflection" because, on the one hand, "we went through the historical process of bankruptcy of real socialism (revolutions in Eastern Europe, the collapse of communism) at the end of the 1980s and into the 1990s" (Melo, 2023, p. 106-107). 106-107), on the other, "because the direction of emancipatory struggles was reconfigured in the wake of a plurality of progressive struggles around the world, which could no longer be reduced to the framework of economic issues" (Melo, 2023, p. 106-107).

3 Curriculum and Curricular Contents

As we know from the literature, it is no longer acceptable to consider Curriculum only as curricular contents to be taught in any intentional teaching-learning process. Its origin is commonly attributed to the Latin *currere* (Sacristán, 1998), a verb that means route or, as William Pinar (2016) puts it, to run the course. In this complicated debate (Pinar, 2016) that is the Curriculum, many themes, methods and approaches (Pacheco; Pereira, 2007) are possible—and necessary—, and intentional theoretical and epistemological reductionisms have no place in it.

However, we cannot deny the origin of this vast field of studies, reflections and investigations that is the field of Curriculum, which was born as a field for studying teaching content, or, as I will discuss here, curricular content, in reference to Peralta (2017). Hence, making it clear that I intend to reduce the theoretical, methodological and epistemological diversity that

[3] For Fraser (2002), while economicism refers to a monist social theory which defends that culture can be reduced to political economy, culturalism refers to a monist social theory which defends that political economy can be reduced to culture.

exists in the field of Curriculum to curricular contents, I point out that, for the purposes of this text, I will take Mathematics curricular contents as an expression of Mathematics Curricula, understanding both its historical dimension and the commitment to fulfill the objective proposed in this essay.

When discussing topics related to the relationship between Curriculum and Teaching, Sacristán (1998, p. 122) reminds us that "the discussion about what to teach focused on the Anglo-Saxon tradition around the curriculum, a concept first defined in the purposes and contents of teaching, which was later expanded." Referring to Didactics, which is little concerned with the content to be taught and more with the teaching activity in general, Sacristán (1998) highlights that the contents of the teaching process was the main concern of the first Curriculum theories. Thus, highlighting curricular content is a way of measuring some formative intentions, considering that all curricular content is socially, historically, pedagogically, philosophically, sociologically located, constituting the school culture and expressing the desires and interests of the hegemonic social groups in each historical period.

For this reason, and for many others, Michael Apple (2013b, p. 71) reminds us that, no matter how much it is presented or expressed—also—through curricular content, the "curriculum is never just a neutral set of knowledge." And the result of the process of selecting the curricular content to be taught expresses the wishes, interests and intentions of dominant social groups in terms of economic and cultural issues. It is no coincidence that "the curriculum and more general educational issues have always been tied to the history of conflicts of class, race, gender and religion" (Apple, 2013a, p. 49). Using Apple (2006), we see that the curricular contents listed through school subjects in different historical periods are expressions of an intention to (con)form social reality, which respects and works in favor of the cultural and economic interests of those people or groups who, by being able to influence the decision-making processes regarding these contents, establish a hegemony that requires, on the one hand, that people are educated with certain skills and competences and, on the other, that these people do not seek to break with the current status quo, maintaining the reproduction of social reality without major complications. Hence the necessity to discuss the Curriculum and curricular contents for thinking about the Education—that is, training—of the masses in a broad manner.

However, the result of this selection process is not a smooth one. As Miguel Arroyo (2013) rightly points out, the Curriculum, in general, constitutes a contested terrain. Specifically, with regard to curricular content, this dispute revolves around the selection of the most necessary and indispensable knowledge. In fact, several groups dispute the hegemony of social reality, and controlling the selection of curricular content to be taught in schools is a way of establishing this hegemony. In short, disputes over the curricular content to be taught in basic education are, ultimately, a dispute for power.

4 Mathematics Education for Social Injustices

To show how the Mathematics curriculum content in basic education (re)produces social injustices, as it stems from a historical and intentional selection process following political-economic and/or political-cultural interests, I will discuss two episodes from the History of Brazilian Mathematics Education: the Escolas de Primeiras Letras (Early Literacy Schools) and the Modern Mathematics Movement.

Based on discussions of the literature, I will characterize these two relevant episodes for the History of Mathematics Education and then problematize, with an intelligible understanding of Social Justice and from a curricular perspective, how these examples illustrate how the Mathematics curriculum content in basic education (re)produce social scenarios of injustice,

especially because they stem from a historical and intentional selection process following political-economic and/or political-cultural interests. Respecting the chronology, I will start with the Early Literacy Schools.

During the Brazilian Empire (1822-1889), Dom Pedro I enacted the Law of October 15, 1827, which became popular as the Law of the Early Literacy Schools and is recognized as the first great general law of Brazilian education (Saviani, 2009). It contains the first orientations and guidelines for thinking about people's formal education in Brazil, whether in terms of the curricular content to be taught or in terms of the teaching profession, among other issues.

During this period, I would like to draw attention to one of the dimensions of the Early Literacy Law: the distinction between the Mathematics curriculum for boys and girls (Gonçalves Filho, 2016; Peralta, 2022).

> In 19th century Brazil the education provided valued intellectual skills for boys and manual skills for girls, and the difference in the length of time it took to educate both. Boys were recommended an education intended at developing a manly posture, guaranteeing the full development of intellectual capacity and aiming to enter institutions recognized at the time to complete their education (Santos, 2011, p. 93).

While boys were assigned the more elaborate Mathematics curricula, girls were restricted to the four arithmetic operations as set forth in the guidelines described in articles six and twelve of the Law:

> Art. 6. Male teachers will teach reading, writing, the four arithmetic operations, the practice of fractions, decimals and proportions, the most general notions of practical geometry, the grammar of the national language, and the principles of Christian morality and the doctrine of the Roman Catholic and Apostolic religion, according to children's comprehension, preferring for reading material the Constitution of the Empire and the History of Brazil.
>
> Art. 12. In addition to what is stated in Art. 6, Female Teachers, excluding notions of geometry and limiting the instruction of arithmetic only to its four operations, shall also teach the skills that serve the domestic economy; and those women who, being Brazilian and of recognized honesty, show themselves to be more knowledgeable in the examinations carried out in the form of Art. 7, shall be appointed by the Presidents in Council (Brasil, 1827).

As noted in the previous citations concerning mathematics teaching, boys were given the curricular content considered to be of a high level and social value at the time: the four arithmetic operations, fractions, decimal numbers, proportionality and notions of Euclidean geometry. Girls, on the other hand, were only taught the four arithmetic operations. In addition to the distinctions regarding the mathematics curriculum, I would like to draw attention to Peralta's (2022, p. 9) discussion in relation to the strictly androcentric nature of this law which established criteria for becoming a teacher in the Early Literacy Schools: "The expression 'recognized honesty,' at the time, referred to ladies' 'reputation' which ultimately aimed to control women by frightening them, watching over them and attacking their sexuality."

The Modern Mathematics Movement, which emerged globally around the 1950s with the aim of modernizing—read updating—the mathematics curriculum content of basic education arrived in Brazil between the late 1950s and the early 1960s—during validity of the 1961 Guidelines and Bases Law—with the country having already tried to modernize its mathematics teaching, especially since the 1920s (Miorim, 1998; Pinto, 2005).

With Osvaldo Sangiorgi (Silva, 2007; Valente, 2008) as one of its main forerunners in Brazil, the movement's main objective was to "bring the mathematics taught in basic schools closer to the mathematics produced by researchers in the field" (Silva, 2006, p. 51), with too much emphasis on knowledge of algebraic structures, set theory, notions of topology and, to some extent, geometric transformations.

> In Brazil, the Modern Mathematics Movement arrived with the intention of being an alternative to overcome the difficulties existing in traditional teaching. Mathematics contributed to an intellectual and economic elitism due to the low student performance. The discipline sought to train students in rules, formulas and calculations without applications and the curriculum presented Arithmetic, Algebra, Geometry and Trigonometry as separate and isolated branches of Mathematics the study of which was only started after completion of the other (Soares, 2001, p. 78).

During the period in which this movement was in force in Brazil, several issues related to Mathematics teaching needed to be reviewed, such as the content in Basic Education Mathematics textbooks (Garnica, 2008). Moreover, the movement reverberated in a large-scale debate related to concerns about teaching how to learn Mathematics in Basic Education, with the holding of the first national congresses on Mathematics teaching from 1955 onwards (Soares, 2001) and the creation of research groups like the Mathematics Teaching Study Group (GEEM), in 1961, in São Paulo, and the Mathematics Education Study and Research Group (GEPEM), in 1976, in Rio de Janeiro (Fischer, Silva, Oliveira & Pinto, 2007; Oliveira, Silva & Valente, 2011).

These two examples included in discussions on the History of Mathematics Education in Brazil illustrate how the Mathematics curriculum content in basic education is product of a historical selection process that respects and meets certain political-economic and/or political-cultural interests.

The expression of these interests, mainly of a political-cultural nature with political-economic implications, at the Early Literacy Schools is closely related to the maintenance of a social status quo that delegates domestic chores to women and rationality and intellectual prowess to men. While men were given what was considered prestigious knowledge of greater social value at the time because they were 'worthy' and 'capable' of understanding said knowledge, women were given only the basic and necessary knowledge—the four arithmetic operations—to be able to fulfill their androcentric social and cultural role: being responsible for domestic work and caring for children and the elderly.

In addition to conditioning the mathematical learning of girls and women to a level infinitely inferior to that of boys and men, the Early Literacy Law reinforced the social ideology that girls and women are not suited to Mathematics, both because they are destined only for domestic and care work and because they are 'inferior' in relation to boys and men, who are, in fact, endowed with intelligence, rationality and deserving of having the most refined mathematical knowledge available at the time to be learned in schools. In this scenario, we see clearly how the mathematics knowledge taught in the Early Literacy Schools contributed directly to reproduce an unjust, exclusively sexist and excessively androcentric social reality, as discussed by Peralta (2022) when investigating records from the Federal Senate archives that narrate the enactment of the Early Literacy Law.

Regarding the Modern Mathematics Movement, I emphasize that the overvaluation of mathematical knowledge related to abstraction expresses the political-economic interests—with political-cultural implications—of a group concerned with offering mathematical training

so that people could face the exponential industrial and technological development underway. With the end of the Second World War and at the height of the Cold War, it was urgent that workers had full mathematical capabilities and skills to address the new industrial, technological and market equipment and processes of the time.

Given that mathematical language is indispensable in developing Natural Sciences knowledge and in managing new technologies, it was a practical necessity for the development of capitalism—which would soon enter its neoliberal phase—that people be endowed with mathematical skills related to abstraction to be prepared for the job market that presented profound changes in its format, with the inclusion of new devices, new production processes and product management. It is no wonder that Brito (2012) exemplifies how Mathematics was at the center of political-economic disputes in Brazil during the 17th century.

While strongly appealing to the development of abstract thinking with a focus on Algebraic Structures, Set Theory and Notions of Topology, other mathematical knowledge like Geometry was not as valued by the Modern Mathematics Movement (Burigo, 1989; 2006; Pavanello, 1993; 1989; D'Ambrosio, 1987), even though Geometry teaching persisted to some extent during the period in which the Modern Mathematics Movement was in force in Brazil (Matos & Silva, 2011; Silva, 2022).

We see thus how mathematical knowledge was used to reproduce an unjust social reality, given that the Mathematics curriculum content was not designed to teach basic education students the essential knowledge to act in the world—to understand phenomena, analyze processes, among many others—in a critical and conscious manner, but rather to respond to the needs and demands of reproducing the capitalist system that structures and organizes our social relations, including those of an educational nature, valuing profit, accumulation and the ideologization of the masses. I don't need much to affirm how unjust capital has been since Marx.

In this attempt, with these examples, I sought to fulfill the objective I set for myself, showing and discussing how Mathematics Education served—and can serve— for the production and reproduction of social injustices, as well as highlighting its non-neutrality in the face of social reality (Taveira, 2023). Mathematics curriculum content in basic education, at different historical moments, expresses both the needs and the formative intentions of the Brazilian population, safeguarding in the formative process in question the needs and agendas of those groups that hold the power to influence and decide in this arena of disputes that is the Mathematics Curriculum, never being just a neutral set of knowledge, as Michael Apple (2013a) rightly reminds us.

5 Final Considerations

In this essay, I sought to demonstrate how the Mathematics curriculum content in basic education (re)produces social injustices, as it stems from a historical and intentional selection process based on political-economic and/or political-cultural interests. To do so, I based myself on two episodes in the History of Brazilian Mathematics Education, illustrating how Mathematics curriculum content in basic education helped to reproduce a characteristically unjust social reality.

Starting from the Fraserian two-dimensional understanding of Social Justice, I pointed out how Mathematics Education has historically lent itself to the reproduction of socially unjust scenarios and, as such, the contemporary importance and necessity to think and practice a Mathematics Education concerned with Social Justice issues.

Although the episodes taken as examples do not take place in the 'post-socialist' period,

in which Fraser situates her two-dimensional theory of Social Justice, the Fraserian perspective of justice served as a theoretical contribution to support an intelligible understanding of Social Justice, highlighting both the cultural and economic issues underlying the social practices that related to Mathematics teaching in 19th- and 20th-century Brazil.

By demonstrating how mathematical knowledge has reproduced—and still reproduces—social injustices, I have sought to make yet another move to challenge the social ideology impregnated in public opinion that attributes neutrality to mathematical knowledge, something I have tried to do in my last few publications.

That said, I believe that Mathematics Education concerned with Social Justice cannot shy away from committing to challenge the ideology of the neutrality of mathematical knowledge, because this ideology is at the core of the force driving reflections and practices related to mathematical knowledge that produce and reproduce scenarios infested with social injustices.

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