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DOSSIER

Internationalization of educational policies within the framework of human rights

Critical analysis of High School curricular reforms: implications for the teaching of Natural Sciences

Análise crítica das reformas curriculares do Ensino Médio: implicações para o ensino de Ciências da Natureza

Nairys Costa de Freitas[a]
nairys.freitas07@aluno.ifce.edu.br

Mairton Cavalcante Romeu[a]
mairtoncavalcante@ifce.edu.br

Maria Cleide da Silva Barroso[a]
ccleide@ifce.edu.br

ABSTRACT

The present work aims to provide a critical analysis of the curriculum reforms for High School, approved through Provisional Measure No. 746/2016 (Law No. 13.415/2017), which addresses public policies directed towards scientific education in Brazil, considering the directions that the teaching of Natural Sciences has taken under such regulations. Thus, this work is a theoretical essay of critical origin, discussing the structure and curricular organization of the subjects that comprise the area of Natural Sciences, which are Biology, Physics, and Chemistry, from the perspective of their teaching within the New High School framework. This analysis utilized relevant references that discuss the hollowing out of the National Curriculum Guidelines within the Common National Curriculum Base (BNCC) for the area of Natural Sciences. This study diagnosed an exacerbation of problems related to the discontinuity of curricular policies aimed at Science Education, the precariousness of teaching, the subjectivity of teaching work, and the formation of individuals oriented towards the qualification of cheap labor, presenting a serious challenge for society and future generations.

Keywords: Curriculum Emptying. New High School. Scientific Education. NCCB.

RESUMO

O presente trabalho tem como objetivo apresentar uma análise crítica a respeito das reformas curriculares para o Ensino Médio, aprovadas a partir da Medida Provisória nº 746/2016 (Lei nº 13.415/2017) que versa sobre as políticas públicas voltadas para a educação científica no Brasil, considerando os rumos que o ensino de Ciências da Natureza tem seguido a partir de tais normativas. Assim, este trabalho consiste em um ensaio teórico de origem crítica, e discute a estrutura e organização curricular das disciplinas que compõem a área de Ciências da Natureza, que são Biologia, Física e Química, na perspectiva de seu ensino dentro do Novo Ensino Médio. Utilizou-se como arcabouço para esta análise referenciais relevantes que discutem o esvaziamento das Diretrizes Curriculares Nacionais na Base Nacional Comum Curricular (BNCC) da área de Ciências da

[a] Instituto Federal de Educação, Ciência e Tecnologia do Ceará (IFCE), Fortaleza, Ceará, Brazil.

Natureza. Este estudo diagnosticou um aprofundamento dos problemas relacionados à descontinuidade das políticas curriculares voltadas ao Ensino de Ciências, à precarização do ensino, à subjetividade do trabalho docente e à formação de sujeitos orientada para a qualificação de mão de obra barata, configurando-se como um grave desafio para a sociedade e para as gerações futuras.

Palavras-chave: Esvaziamento Curricular. Novo Ensino Médio. Educação Científica. BNCC.

Initial considerations

Promoted as a law that promised to improve High School Education and address issues such as absenteeism and school dropout rates, the High School reform focused exclusively on curriculum restructuring, promoting the idea that students could choose what to study (Pinheiro; Evangelista; Moradilo, 2020). Thus, as a consequence of the reforms implemented in the educational field, specifically Law No. 13.415 of February 16, 2017, and the approval of the National Common Core Curriculum (BNCC, acronym in Portuguese) for High School (HS) in 2018, analyses of different aspects emerged, including the relationships between them and their implications (Barbosa; Deimling, 2022). In light of the above, the Law of Guidelines and Bases for Education (LDB, acronym in Portuguese) of 1996 underwent significant modifications, especially in Section IV, Article 35 (Brasil, 1996). With these changes, four areas of knowledge, or formative itineraries, were established: Languages and their Technologies, Mathematics and its Technologies, Natural Sciences and their Technologies, and Human and Social Sciences Applied. Furthermore, in Article 36 of the LDB, the curricular arrangements mentioned in Article 35 were included, with the addition of Technical and Professional Training (Leal; Meirelles, 2021), resulting in five areas of knowledge.

The word *reform* is frequently used in the context of Brazilian education. However, this word, in an international context, is considered as a state plan that sets goals and objective criteria, aiming to garner public policies to support it, in order to foster initiatives that mobilize human and financial resources to strengthen the proposed changes (Timpane; White, 1998). It is important to consider that with every change of government, reforms emerge that impact Basic Education, leading to a process of changes at the national level and tending to reaffirm the centralizing role of the State in issuing norms and regulations (Krasilchik, 2000).

The approval of the New High School (NEM, acronym in Portuguese) led to the 'demonization' of the previous High School model in the eyes of society, presenting it as inadequate for students and thus justifying the need for change (Lima-Filho, 2019). Moreover, Cássio and Catelli Jr. (2019) argue that the High School reform was justified by the inadequacy of the curricula and the discouragement the traditional model caused in students' retention.

Considering these justifications for the High School Reform, the approval of the BNCC-EM in 2017 is considered absolutist in nature (Caetano, 2019), where collective discussions were not taken into account (Valle, 2020), overshadowing the National Education Plan 2014-2024 and analyses that had been fluidly occurring regarding the development of goals and public policies related to Brazilian education in previous years (Costa; Silva, 2019). Thus, the mobilizations of the BNCC and its organizers in the public-private sectors found justification to act in the then Brazilian political

context (Caetano, 2019). Valle (2020) argues that the third version of the BNCC, approved as the final document, is the most problematic among the three versions. We can also read that:

> From September to December 2017, the National Common Core Curriculum (BNCC) passed through the National Council of Education (CNE) in a non-transparent manner and was approved disregarding the work already done by educational institutions committed to public education with social quality. This occurred under strong resistance from three counselors, representatives of national entities, who voted against the BNCC, as well as several institutions and associations of teachers and researchers who expressed their opposition to the BNCC. The approval of a public policy in an undemocratic manner, without transparency, and without broad discussion with Brazilian society reveals the modus operandi of the individual and collective actors who are part of both public and private institutions (Arelaro; Peroni; Caetano, 2019, p. 43, our translation).

In light of the reflections obtained, the third version of the BNCC emerged with all stages of Basic Education restructured and based on uncertain and inconsistent purposes (Valle, 2020). Thus, the BNCC is regarded as a normative document (Brasil, 2018a, p. 7), which complies with the requirements of Law No. 13,005/2014 (Brasil, 2014), responsible for establishing the National Education Plan (PNE, acronym in Portuguese), with the aim of achieving 20 goals within a ten-year period (2014–2024), based on learning and development rights and objectives. Therefore, the BNCC is cited as the main strategy for goals 02, 03, 07, and 15 of the PNE (Barros; Dias, 2023).

The BNCC was developed between 2015 and 2018, revealing the influence of international institutions on Brazilian education (D'Ávila, 2018; Mattos; Amestoy; Tolentino-Neto, 2022). Through a global agenda, colonized countries tend to conform to the standards globally established by wealthy countries. Thus, within the educational perspective, standardization occurs through curriculum alignment, teacher training, and the production of didactic material (Freitas, 2018; Branco; Branco; Iwasse; Zanatta, 2019; Brasil, 2022). The origin of the BNCC arose from a process of standardization and conceptions that consider education as a service, heavily betting on the market, aiming to shape citizens according to these models, specifically targeting poor youth with the goal of recruiting them as cheap labor (Hypólito, 2010; Macedo, 2014; Costa, 2018).

The process of drafting the base included 12 million contributions to its text. However, the lack of transparency regarding the fate of these contributions made the process diffuse in terms of its democratization (Micarello, 2016; Oliveira, 2018; Mattos; Toletino-Neto; Amestoy, 2021). With the legitimization of the BNCC, the NEM reveals the difficulties imposed due to the inconsistency of educational public policies, harming the population that relies on public education (Barbosa, 2018), and prioritizing large-scale assessments, which benefit the productive market through a utilitarian curriculum focused on competencies and skills. Thus, based on these considerations, we fear the expansion of social inequalities throughout the national territory (Trindade; Malanchen, 2022). According to Silva (2015, p. 375):

> It is certainly on the horizon that the National Common Core Curriculum will establish itself as a control strategy also through assessments, and once again, it will not only reiterate inequalities but may also reinforce them. The exams currently have a direct impact on choices in terms of curriculum. Now, the National Common Core Curriculum would start determining

> the content of the exams. This is one of the justifications for its existence: to ensure greater reliability in assessments (Silva, 2015, p. 375, our translation).

A reform of this magnitude aims to transform public schools into an identity-driven environment that endorses ideologies favoring the bourgeoisie and postmodern thought, aiming at the necessary weakening of the school curriculum to benefit the world of work in capitalist society (Trindade; Malanchen, 2022). Thus, it is a contingent idea of "... individual experience, (the) tacit knowledge, (the) everyday life, the immediate reality" (Malanchen, 2016, p. 19).

The problems in Education go beyond curricula, as schools perceive students as faceless subjects, disregarding their history, origin, or class, which exacerbates the situation further in the face of changes in High School that amplify social inequalities and the decline of scientific knowledge in public schools (Ponciano *et al.*, 2019). Furthermore, the changes in High School are pointed out as a decline in public educational policies, due to their strong professional profile being associated with the productive sector and cheap labor (Barbosa, 2018). Thus, the financial and social reality of young people attending public schools needs to be considered, as "the poverty and adverse living conditions of children and young people and their families undoubtedly create difficulties for organizing teaching and learning for students" (Libâneo, 2013, p. 38).

The privatization movements pretend to be progressive, making them one of the most unpleasant aspects, as they are not progressive. History shows society that they are reactionary: they stole the word reform, with the false discourse that they would improve schools, instead of admitting that they want to replace public schools with private schools, religious schools, profit-making schools, online schools, any type of school that is not public (Ravitch, 2017).

Based on this premise, there was a fragmentation of High School into 'formative itineraries', compromising the right to education for a large portion of students enrolled in public education (Costa; Silva, 2019). This fragmentation resulted in the emptying of the curriculum and the weakening of content (Pina; Gama, 2020; Leal, 2021; Moreira *et al.*, 2023), in addition to strengthening scientific denialism (Vilela; Selles, 2020). All of this was justified by the false idea of a more flexible curriculum, supposedly capable of attracting students' interest and reducing dropout rates (Costa; Silva, 2019). However, the trend of this reform is to deepen the duality in High School and accentuate social inequality, denying students an equal educational offer and further promoting the commodification of education (ANFOPE, 2016).

In addition to the structural problems and social inequalities existing in public education, scientific denialism is already a reality in society, having a strong influence on social networks and ideologically rooted in the conservative movement in Brazil (Vilela; Selles, 2020). Coincidentally, with the High School reform, denialism emerges with the advent of the Internet and social networks, which accommodate and empower identity groups, the consumption of misinformation and false beliefs, questioning Science and democratic values, making aggressive discourses gain relevance instead of dialogue and the debate of ideas (Bosco, 2017).

In Basic Education, the curriculum is directed solely to meet the needs of external assessment content, manifesting knowledge restrictions, especially for the children of the working class who rely exclusively on school to access it (Trindade; Malanchen, 2022). Thus, regarding High School

(Brasil, 2017a), only 60% (sixty percent) of the curriculum is reserved for areas of knowledge, manifesting the content depletion in the BNCC (Brasil, 2018a). In addition to the knowledge restrictions for the children of the working class, public schools often continue to suffer from structural precariousness, with no forecast for preventive maintenance, lacking school supplies for basic activities, and without equipment for teachers – forcing them to buy with their own salary. These are the main factors that lead to the precariousness of Basic Education in the country (Forgoni; Zacarias; Silva Júnior, 2023).

Based on the bibliographic investigation by Gastaldo (2013) regarding the effects of the High School Reform and the structure that the BNCC advocates for the teaching of the curricular components in the area of Natural Sciences – Biology, Physics, and Chemistry – a reflection is presented concerning the view of academic entities in the educational field (Costa; Silva, 2019). That said, the work of Barbosa and Deimling (2022) was considered, which offers a comprehensive overview of the legislation that preceded the BNCC. This study demonstrates a continuous effort to establish a national curriculum, highlighting the historical complexity of this process.

Based on the reforms carried out in the educational field, this paper aims to analyze the perspectives for Science Education within the framework of the New High School.

Changes in Natural Sciences Content, Formative Itineraries in the BNCC, and the Limitation of Access to Scientific Knowledge

National and international literature increasingly presents evidence that interventions carried out through curricular reforms systematically fail, not showing a reduction in social and racial inequality indexes (Loveless, 2016; Ravitch, 2011; Reid, 2009; McCarty, 2009). The introduction of formative itineraries in High School has been pointed out as an aggravating factor, as its implementation does not adequately consider the needs of schools, teachers, and students. The lack of planning, resources, and adequate training results in various difficulties in executing this curricular modality (Silva; Boutin, 2018). As Pinheiro, Evangelista, and Moradillo (2020, p. 251) state:

> For example, let's say that a student has decided to pursue the area of natural sciences and their technologies. If the school near her residence only offers the language and technology itinerary, this student will have to travel in order to continue her studies in the desired area – and the transportation costs will have to be covered by the family – or she will have to take the itinerary that is available to her, even if it is not her choice. Considering that the option is not offered in the student's home municipality, she will face not only the cost but also the travel time to a nearby municipality. We must also analyze schools located in rural areas, which are already extremely neglected and would likely have fewer itinerary options. Would the State ensure transportation for these students? What would be the situation of thousands of adolescents in these conditions? (Pinheiro; Evangelista; Moradillo, 2020, p. 251, our translation).

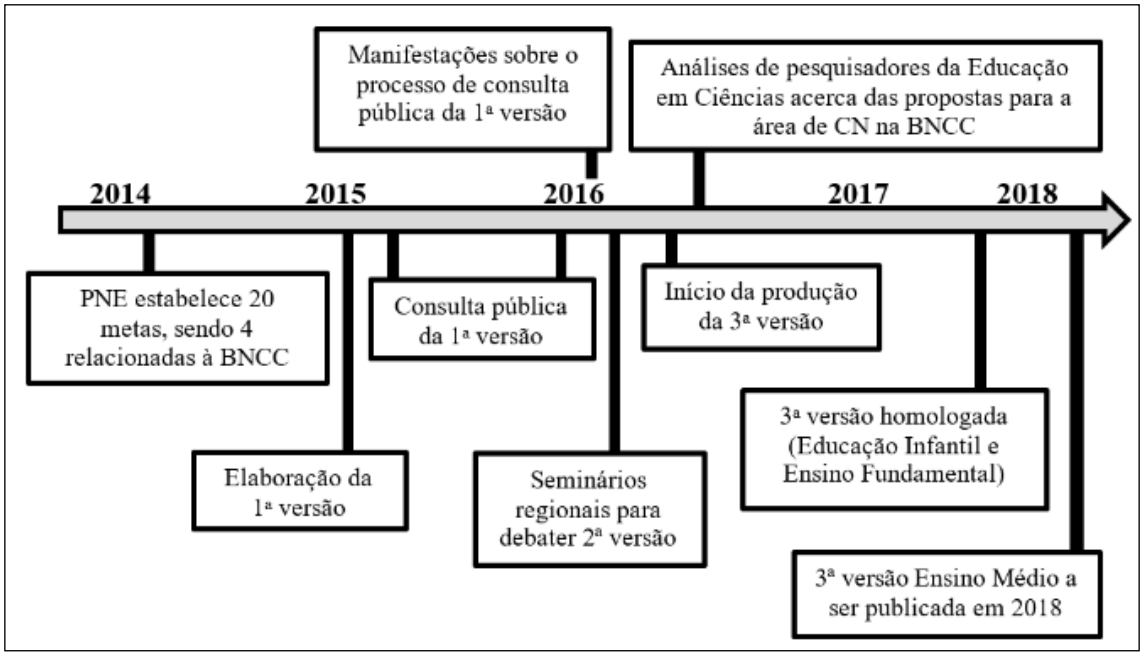
The authors state that the incorporation of formative itineraries, without considering the structural conditions of public institutions, exacerbates existing problems, further deteriorating the quality of education offered. As a result, students will have to choose an area of knowledge offered

by the government, whereas before this was only possible after completing High School to take university entrance exams (Pinheiro; Evangelista; Moradillo, 2020).

Thus, guiding this discussion is the work of Marcondes (2018), which reports that the technical committee responsible for drafting the first and second versions of the BNCC met periodically under the supervision of Professor Dr. Hilda Aparecida Linhares da Silva Micarello (Federal University of Juiz de Fora - FUJF). Furthermore, the team of advisors in the area of Natural Sciences included Professors Edenia Maria Ribeiro Amaral (Federal Rural University of Pernambuco - UFRPE), Luiz Carlos de Menezes (Institute of Physics of the University of São Paulo - IFUSP), and Rosane Meirelles (State University of Rio de Janeiro – UERJ). It is important to highlight that the group of specialists was composed of 20 educators, 9 from municipal and state education networks and 11 from public universities, from different regions of the country. This group was organized into subgroups according to the school level in Elementary Education and by subject in High School. Based on this, the aforementioned group undertook a bold effort to construct a project that would serve as a national reference for the curricula of Elementary and High School Education.

The third version of the BNCC was coordinated by Professor Dr. Ghisleine Trigo Silveira and was delivered on April 2, 2018, to the National Council of Education (CNE, acronym in Portuguese) (Brasil, 2018a). The amendment of the second law presented one of the greatest dangers of the High School reform, as it involves the adoption of formative itineraries taught alongside the BNCC content. Thus, the quality of Science Education offered is questioned, given that it already faces difficulties (Pinheiro; Evangelista; Moradillo, 2020). The recurring criticisms are motivated by recent events in the BNCC, as well as the possibility of different interests coming into conflict or organizing themselves. Figure 1 shows some important events in the production of the BNCC versions, according to Franco and Munford (2018):

Figure 1: Main events in the creation of the National Common Curricular Base



Source: Franco and Munford (2018).

As shown in Figure 1, the proposal for a common curricular base is not recent, as it is present in the Brazilian Federal Constitution, in Article 210 (Brasil, 1988) and was reaffirmed by the LDB in Article 26 (Brasil, 1996). In 2009, the *Currículo em Movimento Program* (Brasil, 2009) revived the initiative in defense of a common curriculum. The discussions by Franco and Munford (2018) are based on the changes regarding the specific aspects of Natural Sciences in the BNCC, with emphasis on the manifestation of the contradiction in the attempt to "streamline" the document's content.

It is worth noting that in the second version of the Base, the number of learning objectives was classified as excessive (Brasil, 2017c). Franco and Munford (2018) highlight that the third version of the BNCC shows an increase in the number of skills correlated with the objectives. Regarding Natural Sciences, there were initially 99 skills, of which 87 remained, 12 were excluded, and 23 were added. In the end, 110 skills were deliberated in the current version.

With the changes that have occurred, students may be harmed, as the specific science of the subjects has been removed from the BNCC, reducing the importance of specific content and obscuring its meaning (Santos; Moreira, 2020). Lima (2023) considers that the reforms have harmed the work of teachers as well as the students' ability to develop critical thinking, interfering with the broad formation of scientific knowledge in High School.

Perspectives for Teaching Natural Sciences

The area of knowledge known as Natural Sciences and its Technologies (NST), which encompasses the curricular subjects of Biology, Physics, and Chemistry in High School, is also known as a formative itinerary. In accordance with the BNCC (Brasil, 2018a), the NST area occupies pages 547 to 560 of the document. However, the implementation of the BNCC and the consequent restructuring of High School through the LDB has been the target of criticism (Cássio; Catelli Júnior, 2019), generating debates about the role of the Base in curricular organization, considering it a representation of policy control and curricular emptying. Süssekind (2019) supports this view, highlighting the submission of teachers to a predetermined curriculum. This centralization, according to the authors, results in a pedagogical practice that disregards the school reality and the needs of students.

In the NST area, the current scenario is marked by the workload and integration of the subject (Rodrigues, 2023). Moreover, the works of the National Textbook Program (PNLD) of 2021 (Brasil, 2021) are classified by area of knowledge, and one of the changes is that all selected collections in the NST area can be categorized by teachers trained in the specific subjects (Biology, Physics, and Chemistry). However, according to the organization of the NEM, the subjects are unified and should be worked on in an interdisciplinary way between teachers and students, whose age ranges from 14 to 16 years, and they have the autonomy to choose (or not) the Natural Sciences itinerary (Leal, 2021).

The approach to scientific learning adopted in each country exerts a direct influence on the didactic strategies employed in the teaching of scientific subjects (Krasilchik, 2000). This influence began after World War II, when Science and Technology transformed into a vast socioeconomic

enterprise, raising concerns strictly regarding the study of sciences at various levels of education (Krasilchik, 1987; Canavarro, 1999). However, the construction of a genuinely democratic, just, and equitable society requires a scientific education that provides citizens with the opportunity to perceive and fulfill their role in the essence of replacing neoliberal ethics with an ethics that opposes individualism and the colonization of Science and Technology. These principles necessitate that schools provide the experience of reflection and the construction of scientific knowledge within an emancipatory conception (Veiga, 2002; Nascimento, 2009).

Katuta (2019) addresses in her work the mercantilist and financial logic present in the curricular reforms carried out between 1998 and 2018, highlighting the intensity of the processes as well as the problematization of the curricular proposals, which, from an ontological and epistemological perspective, have the same propositions. Compensatorily, Lino (2017) considers that the current High School may contribute to the increase in dropout rates and, instead of reducing and providing quality education, may hinder the work of teachers. Although there is concern regarding the High School curriculum, the structural problems of schools have been ignored (poor physical facilities, lack of laboratories and didactic materials for experimental classes, absence of libraries, lack of adequate space for physical activities), the devaluation of teachers, and the lack of public policies that promote the retention of young people from popular classes in schools. Given all the difficulties pointed out, what is proposed for High School does not offer satisfactory conditions for the proper functioning of education (Krawczyk; Ferretti, 2017; Moll, 2017; Moura; Lima Filho, 2017).

Saviani (2011) presents the role of school and curriculum in education, specifically in school pedagogy:

> The school has the role of enabling new generations to access the world of systematic knowledge, methodical and scientific knowledge. It needs to organize processes, discover forms appropriate to this purpose. This is the central issue of school pedagogy. Content does not represent the central issue of pedagogy because it is produced from social relations and is systematized autonomously in relation to the school. The systematization of content presupposes certain skills that the school normally ensures, but it does not occur within the basic education schools. The existence of systematized knowledge presents the following problem to pedagogy: how to make it assimilable by new generations, that is, by those who in some way participate in its production as social agents, but participate at a certain stage, a stage that is the result of an entire historical trajectory? (Saviani, 2011, p. 66, our translation).

Based on Saviani's (2011) words, it is through Law No. 13,145/17 that the school loses the opportunity to bring this knowledge to students, placing more emphasis on a fragmented and alienated education from human conditions, focusing only on conceptual and practical content for the training of technical labor. However, this strategy is of interest to the ruling class, with the purpose of keeping the dominated class always as laborers. Thus, the working class aims for knowledge to be accessible, so that with systematized understanding it is possible to reverse the current situation (Pinheiro; Evangelista; Moradillo, 2020).

The changes that have occurred in High School are considered a setback in public educational policies, as it involves comprehensive education with a professional profile associated with the productive sector (Barbosa, 2018). According to Law No. 13,145/17, the federative units had to

adjust their curricula so that the workload increased from 2,400 hours to 3,000 hours in regular High School, establishing fostering policies, funded by the Ministry of Education (MEC), as per Article 13, for the establishment of Full-Time High Schools (Silva; Krawczyk; Calçada, 2023).

To reach a total of 3,000 hours in the regular period, the Law proposes that the NEM curriculum is composed of two parts. One part is dedicated to Basic General Education (BGE) as per the BNCC, with up to 1,800 hours, and the other, diversified, with at least 1,200 hours. The diversified part consists of formative itineraries, elective subjects, life projects, and some local component (Brasil, 2017a). Regarding the NST itinerary, Leal and Meirelles (2021) consider that the content is mentioned in a simplistic manner compared to other curricula in this area in regular education.

Regarding the choices made by students, the authors Silva, Krawczyk, and Calçada (2023) consider it an omission, as the Law itself ensures that the provision of formative itineraries is subject to the material and human conditions of educational institutions, reducing the broad spectrum of possibilities, as pointed out by researchers (REPU, 2022). In line with this, Silva and Boutin (2018) state that:

> Regarding the formative itineraries, which refer to the educational options of the dictatorial period, despite the media propaganda about the opportunity of choice for young people, the text of the law makes it clear that these itineraries are at the discretion of the educational systems, not the student (Silva; Boutin, 2018, p. 529, our translation).

In agreement with Silva and Boutin (2018), one of the problems to be overcome is the curricular emptying in the BNCC, where from an epistemological perspective of the innovative and transformative discourse of Basic Education, there is a tendency to discredit the importance of theory in student education (Malanchen; Santos, 2020, p. 12). Additionally, Rodrigues' research (2023) confirms the reduction of content in the NST area. Moreover, there is a noticeable presence of conceptual errors, process failures, and the use of outdated nomenclatures, revealing significant problems in textbooks in general (Ferreira, 2020).

From this perspective, it is possible to observe that the right to access scientific, philosophical, and artistic knowledge of human origin (Saviani, 2003) is being denied due to the reduction of content in the NST area in High School, a consequence of the reduction in the workload of curricular components and the merging of subjects by area (Moreira et. al., 2023). According to Malanchen and Santos (2020), the implementation of the current High School has solidified an education model considered exclusionary, as its structure is linked to the competency paradigm and aligned with the principles of neoliberalism.

The training of Natural Sciences teachers from the perspective of the BNCC and Law No. 13,415/2017

Regarding teacher training, Branco and Zanatta (2021) address in their work a concern about the adaptations that may occur to align teacher education programs with the BNCC and Law No. 13,415/2017, leading to significant changes. The aforementioned Law mandates that the BNCC serve as a reference for teacher education courses, stating that the curricula of teacher training

courses will be based on the National Common Core Curriculum (Brasil, 2017b). In light of this recommendation, Marques (2022) presents a proposal for a Physics Teacher Education program with emphases, based on his experience as the coordinator of the Physics Teacher Education program at the Federal University of Goiás (UFG). Regarding teacher training, Article 6 of Law No. 13,415/2017 promotes changes to Article 61 of Law No. 9,394/2017, recommending that:

> [...] professionals with recognized expertise by the respective education systems, to teach content in areas related to their training or professional experience, certified by specific qualifications or teaching practice in public or private educational institutions or private corporations where they have worked, exclusively to fulfill the provisions of item V of the head of Article 36 (Brasil, 2017b, our translation).

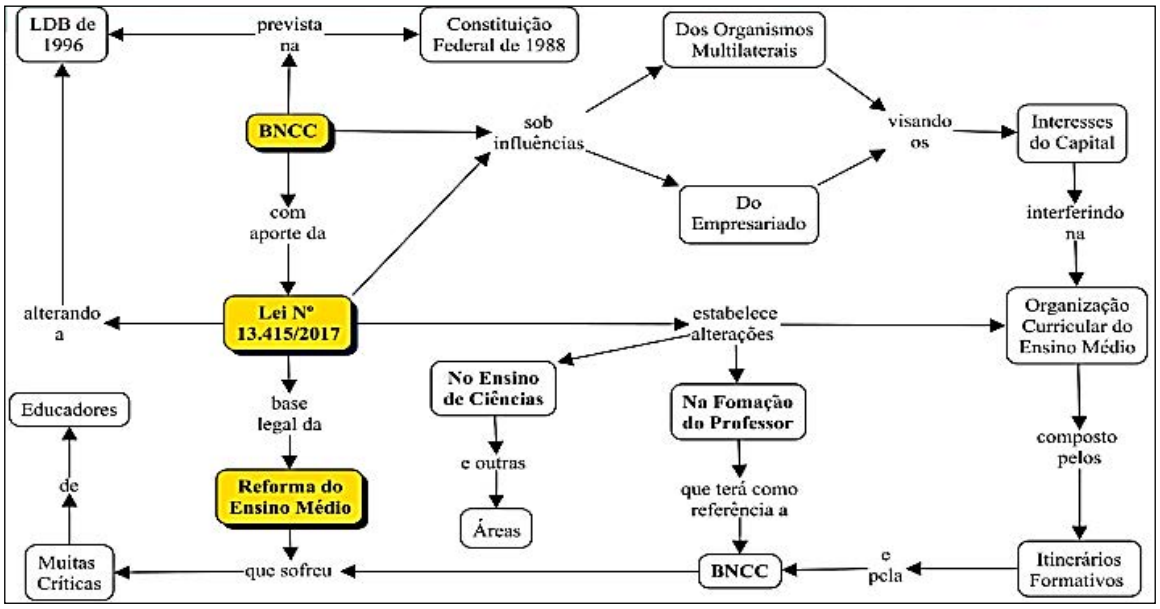
In this context, individuals with undergraduate degrees but without teaching certification can teach corresponding subjects, being evaluated based on their "recognized expertise", to the detriment of formal qualifications. In agreement, Article 30 of this regulation allows that "professionals with undergraduate degrees who have completed pedagogical complementation programs or concluded a stricto sensu postgraduate course oriented towards teaching in Basic Education may be admitted teaching in High School" (Brasil, 2018b, p. 15). However, Nascimento, Fernandes, and Mendonça (2010) emphasize the importance and urgency of providing teachers with solid scientific and pedagogical training, enabling them to acquire socially and culturally relevant scientific knowledge, as well as the learning, improvement, and planning of teaching strategies.

The principles of the BNCC are aligned with Malanchen and Santos' statement (2020, p. 9) when the authors assert that it is about "developing skills and competencies that consolidate the pedagogical principles of maintaining the capitalist mode of production, using public schools as a means of disseminating these ideologies". Thus, based on this premise, the NEM does not contribute to the emancipation of the Science Education approach. Franco and Munford (2018) confirm that the final version of the BNCC does not refer to the structuring axes that belong to scientific knowledge.

Ribeiro and Ramos (2017) consider that the BNCC, in relation to Science Education, is characterized as a list of content to be taught by teachers, whose pedagogical proposals do not surpass those established many years ago in education. According to Branco and Zanatta (2020), Law No. 13,415/2017 directly interferes with the structure and quality of science education. From this perspective, Rodrigues, Pereira, and Mohr (2021) encourage the continuation of the debate on curricular public policies aimed at teacher training, which were developed and approved without informing schools and researchers in the field, resulting in a distortion of science due to the control and standardization of educational processes.

Figure 2 presents a diagram showing the relationship between the Law, the BNCC, Science education, and teacher training:

Figure 2: Relations between the BNCC, the High School Reform, Science teaching and teacher training under the support of Law No. 13,415/2017



Source: Branco and Zanatta (2020).

Figure 2 shows a diagram of the main changes that occurred in High School. It is worth noting that the text makes it clear that the workload for Natural Sciences education could be reduced, as according to Law No. 13,415/17, only the teaching of Portuguese Language and Mathematics is mandatory in all three years of High School (Brasil, 2017b).

Faced with a High School that only serves to reproduce the interests of the ruling class, with education based on competencies and skills, aiming to prepare young people for the world of work, "there is no interest in an education that provides solid training and is based on the transmission of knowledge built by humanity" (Freres; Rabelo; Mendes Segundo, 2008, p. 7). In Ravitch's view (2017), the changes in High School are not considered a reform but rather destruction. Considering this statement, the main events involving denialist groups, who work to discredit Science, have been on the agenda since 2019:

> One group, for example, ignored the various solar eclipses recorded by scientists and observed by different populations in various locations around the world, as well as images of Earth produced by satellites, to claim that the blue planet is flat. Anti-vaccine movement supporters turned their backs on the records of the effectiveness of population vaccination programs. To counter the scientific knowledge they denied, with their eyes closed, flat Earth defenders presented supposed empirical tests to demonstrate the flat shape of the Earth, and with their backs turned, anti-vaccine movement supporters made claims about supposed links between vaccination and the rise of certain illnesses (Peixoto, 2020, p. 1016, our translation).

Given the constant manifestations of scientific denialism and the absurd number of post-truths circulating in the news and social media, we are left to endure these difficult times by combating denialism (Cassiani; Selles; Ostermann, 2022). Thus, it is concerning that the current and future generations are threatened by the "weakening of the right to Basic Education and are part

of the scenario of setbacks we are witnessing in the country" (Silva, 2017, p. 45). Furthermore, it is essential to understand that the reforms are "fetishized by technological-innovative determinism – stripped of power relations and without historicity" (Motta; Frigotto, 2017, p. 357). Given that Brazil is a large country with diverse cultures, social, and economic problems, the BNCC may not provide accessibility to education for the exercise of citizenship for some groups (Branco; Royer, Godoi Branco, 2018; Marcondes, 2018; Neto, 2014).

Final considerations

The presented work aimed to reflect on the reforms that have occurred in the educational field and analyze the perspectives for Science Education within the framework of the New High School. Based on the discussion, the workload of subjects and formative itineraries, the BNCC, the possible changes in teacher education programs, and the discontinuity of public policies offered were problematized. Thus, in the current High School, the emptying of content has been common, making the preservation and deepening of scientific knowledge difficult.

The theoretical-methodological framework that supports this critique is based on the premise that, within the context of neoliberal thinking, the High School reform represents a setback in public educational policies, bringing with it the mercantilist and financial logic present in the curricular reforms that took place between 1998 and 2018, aligned with the entrepreneurial discourse. From this perspective, one of the challenges to be overcome with the BNCC and Law No. 13,415/17 is the precarization of school content, driven by an arrogance that discredits the importance of theory in basic education, with competencies as the epistemic foundation of the promise of innovation and transformation in education.

In this context, the configuration of the neosubject occurs through the relationship between knowledge and public policies, used for the efficiency of their labor, causing an effect of accountability on individuals. The scenario of the NEM is favorable for scientific denialism, where knowledge has been denied to the children of the working class through the restriction of content in the area of Natural Sciences and the reduction of the workload of its curricular components. With the structure linked to the competency paradigm and its alignment with the principles of neoliberalism, the NEM has solidified itself as an exclusionary and utilitarian profile of education.

Given the relationship between the BNCC, Natural Sciences Education, and teacher training, this work presents a critical reflection on the tensions between what the BNCC document and Law No. 13,415/2017 recommend, and the reality presented by the authors. That said, the work shows that the NEM does not contribute to an emancipatory scientific education, and the BNCC, which governs this educational modality, does not reference the structuring axes of scientific knowledge, creating a concerning factor for teachers and researchers in Science Education.

In conclusion, it is deemed of utmost importance to resist the BNCC, so that the State realizes the importance of reflecting and discussing the future of education with the general public and educational entities, and especially scientific education, aiming to reduce the impacts of this reform on the future of students and teachers.

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NAIRYS COSTA DE FREITAS

Doctoral Student in Teaching, Instituto Federal de Educação, Ciência e Tecnologia do Ceará (IFCE), Fortaleza, Ceará, Brazil.

MAIRTON CAVALCANTE ROMEU

PhD in Physics and Teleinformatics Engineering, Universidade Federal do Ceará (UFC), Fortaleza, Ceará, Brazil; Professor, Instituto Federal de Educação, Ciência e Tecnologia do Ceará (IFCE), Fortaleza, Ceará, Brazil.

MARIA CLEIDE DA SILVA BARROSO
PhD in Education, Universidade Federal do Ceará (UFC), Fortaleza, Ceará, Brazil; Professor, Instituto Federal de Educação, Ciência e Tecnologia do Ceará (IFCE), Fortaleza, Ceará, Brazil.

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