


Historical panorama of science teachers' training: problems and implications permeating the Law of Guidelines and Bases

Panorama histórico da formação dos professores de ciências: problemáticas e implicações permeando a Lei de Diretrizes e Bases

Panorama histórico de la formación de los profesores de ciencias: problemáticas e implicaciones permeando la Ley de Directrices y Bases

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Abstract: This article intends to understand how the Laws of the Guidelines and Bases of the National Education (LDB) and respective amendments has contemplated the training of teachers of sciences and biology teachers pointing out the main problems and implications, from a historical perspective. Through documentary and bibliographical analysis it was highlighted that there is a historical heritage in the degree of the “3 + 1” model, characterized as an appendix of the bachelor’s degree, leading to the non-identification of the profile of the trained teacher; the knowledge separation in scientific and pedagogical of this model further fragmented the curriculum of the course; the poor quality of the teacher license (degrees) created mainly through private initiative after LDB/96 formed disqualified teachers hindering the learning of the teaching. Ultimately, current modifications in LDB went back by attesting to the possibility of assigning teaching to people with “notorious knowledge”. The relevance of resorting to legal texts is highlighted, since the way in which teacher training is approached also reveals the importance attributed to this field by the set of social groups as a whole.

Keywords: Biological sciences. Teaching license. Teacher’s education. LDB.

Resumo: Este artigo pretende compreender de que maneira as Leis de Diretrizes e Bases da Educação Nacional (LDB) e respectivas alterações contemplaram a formação dos professores de Ciências e Biologia apontando as principais problemáticas e implicações, a partir de uma perspectiva histórica. Por meio de análise documental e bibliográfica destacou-se que há uma herança histórica na licenciatura do modelo “3 + 1”, caracterizada como apêndice do bacharelado, levando a não identificação do perfil do professor formado; a separação dos conhecimentos em científicos e pedagógicos desse modelo fragmentou ainda mais o currículo do curso; a má qualidade das licenciaturas criadas, principalmente via iniciativa privada, após LDB/96, formou professores desqualificados prejudicando a aprendizagem do ensino. Em última análise, atuais modificações na LDB retrocedem ao atestar a possibilidade de se atribuir o exercício da docência a pessoas com “notório saber”. Pontua-se a relevância de se recorrer aos textos legais, uma vez que a forma como a formação de professores é abordada revela, também, a importância atribuída a este campo por determinado grupo social em seu conjunto.

Palavras-chave: Ciências biológicas. Licenciatura. Formação docente. LDB.

Resumen: Este artículo pretende comprender de qué manera las Leyes de Directrices y Bases de la Educación Nacional (LDB) y sus alteraciones contemplaron la formación de los profesores de Ciencias y Biología apuntando a las principales problemáticas e implicaciones, desde una perspectiva histórica. Por medio de análisis documental y bibliográfico se destacó que hay una herencia histórica en la licenciatura del modelo “3 + 1”, caracterizada como apéndice del bachillerato, llevando la no identificación del perfil del profesor formado; la separación de los conocimientos en científicos y pedagógicos de ese modelo fragmentó aún más el currículo del curso; la mala calidad de las licenciaturas creadas principalmente vía iniciativa privada después de LDB/96 formó profesores descalificados perjudicando el aprendizaje de la enseñanza. En última instancia,

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las actuales modificaciones en la LDB retroceden al atestiguar la posibilidad de atribuir el ejercicio de la docencia a personas con “notorio saber”. Se puntualiza la relevancia de recurrir a textos legales, ya que la forma en que se aborda la formación de profesores revela también la importancia atribuida a este campo por determinado grupo social en su conjunto.

Palabras clave: *Ciencias Biológicas. Licenciatura. Formación docente. LDB.*

Introduction

Historically, teachers' trainingⁱ to work in popular education in our country emerged more evidently only after the proclamation of Brazil's independence in 1822 (SAVIANI, 2007). According to Scheibe (2008), until this period there was an empiricist conception centered on the idea that it was only enough that the teacher had mastery over the content to be taught in the classroom, their training would be restricted to observing the experienced teachers when thinking of forming the teacher. Thus, the establishment of the republic in Brazil was a reference to reach this understanding of the need for teacher training and indicated as a strategy to build a national project in development.

However, it was only at the beginning of the 20th century that there was a greater concern about the formation of teachers for secondary education (now elementary and high school education), since until then the number of schools and students was very small (GATTI, 2010). Starting from the 1920s and early 1930s, various transformations in teacher training models have taken place and are occurring in Brazil. Reflecting on the problems imposed in the models of higher education in Brazil presupposes positioning the entire political and economic context of the reforms, as well as the requirement for schooling for the population throughout its history. Thinking about teacher training, particularly in Science and Biology, also presupposes adding to these two elements one more that is intrinsically related to the specificity of these school disciplines (AYRES; SELLES, 2012). Historically, with respect to the initial training of biology teachers, one of the main concerns that has been highlighted in this problem is the fact that the courses give a certain privilege to the training of the research scientist in detriment to the formation of the professor of Sciences and Biology (DINIZ-PEREIRA, 2011).

Based on these reflections and through documentary and bibliographical analysis, this research is characterized by a qualitative approach, which will explore the academic debate in the area of research in education about the policies implemented for teachers' training. Resorted to authors such as Saviani (2005; 2007; 2009), Diniz-Pereira (2011; 2015a; 2015b; 2016), Scheibe (2008), Gatti (2010) Krasilchik (1987; 2000) among others, in order to seek to understand and problematize how the formation of science and biology teachers occurred to meet the demand of schooling in Brazilian public education, linking it to the political and economic scenario.

Since the policies for teacher education for basic education are the focus of the debate, it is highlighted by means of documentary analysis, Law n°. 4.024/61 that contemplated the school discipline of Natural Sciences for the first time in Brazilian legislation and became

mandatory in the curriculum, bringing changes to the teaching of this area, the first model of short graduation to form the science teachers for the 1st grade at the time.

With Law n°. 5.692/71, there was the modification that defined and resumed the model of short science courses in Sciences as specific training for teachers, causing consequences for teaching, since the disciplines became professionalizing, discharacterizing its function in the curriculum. Law n°. 9.394/96, considered “the solution” for teacher training, since it required higher education in undergraduate degree, but, however, only moved the locus of teacher training to the private initiative in light courses and without criteria of quality and current changes occurred in the LDB, in 2017, that goes back in the field of teacher training by attesting to the possibility of assigning the teaching practice to people with “notorious knowledge”.

In this context, this analysis is necessary because it aims to understand the trajectory of teacher education of Science and Biology teachers and why this problem still exists today as an issue that needs to be solved and pointed out as important to improve the quality of teaching, because it also implies better teacher training.

Thus, the purpose of this article is to bring a historical analysis to the discussions about the initial formation of teachers at the higher level of Sciences and Biology, pointing out the main problems and implications based on the LDB of 1961, Law n°. 5.692/71, LDB 1996 and current modifications in line with the expansion of higher education in Brazil and the basic school.

First LDB of 1961 and the creation of 1st grade teaching license to form teachers

Until the 1960s, teacher training in Brazil was in line with the changes that occurred in secondary school in elementary school, but this has not changed much. On this fact Ayres and Selles (2012, p. 105) explain:

From the 1930s to the 1960s, secondary education suffered little change. In 1942, the first cycle is reduced to four years, the Natural Sciences course being offered only in the two final grades. The second cycle, divided in Classic and Scientific, and with three years duration, offered in the Classical, Physics and Chemistry, in the two final series, and Biology, only in the last series and in the Scientific, Physics and Chemistry in the three series, and Biology, in the last two. In 1946, the discipline Biology is replaced by Natural History in both courses.

Until that time, for the formation of teachers, there were three projects aimed at the creation of colleges. The first project was led by Fernando de Azevedo, who originated the University of São Paulo (USP) in 1934. The second project was led by Anísio Teixeira, responsible for implanting the University of the Federal District (UDF) in the Federal District in 1935, located in Rio de Janeiro, capital of Brazil at the time. However, in 1939, the UDF was extinguished, its students and some of the teachers went to the National Faculty of Philosophy (FNFi) of the University of Brazil (which currently corresponds to the Federal University of Rio de Janeiro) (AYRES; SELLES, 2012).

It was at FNFi that the third project for teacher training was developed, becoming hegemonic and serving as a model for other universities in Brazil. Just as in USP, in FNFi there were sections for bachelor's degree course with specific knowledge and the special section of the didactics area, which was in charge of the pedagogical and professional training of professionals for the teaching profession. FNFi repeated the “3 + 1” model created at USP and eventually consolidated it to train teachers. It was characterized by the fact that the student obtained the bachelor's degree after completing three years of course in a specific area, needing to do another year of pedagogical training to obtain a Teaching License's degree. Most of the teachers who graduated from the FNFi became professors at the same institution or held bureaucratic positions in the state, so they could teach at the Pedro II College, accumulating a teaching position at FNFi (AYRES; SELLES, 2012).

As for the training of teachers in the Natural Sciences area for secondary education within the FNFi training model, this formation occurred in the Science sector, making it clear which teacher profile they should form:

Considering the model established in the FNFi, the teachers' training for secondary education was given in the natural sciences area through the Science Sector, responsible for specific knowledge, and complemented by the Special Section of Didactics, which offered the called “Didactics Course”, which added to the specific knowledge already acquired the pedagogical knowledge about how to teach, with emphasis on Psychology, didactics proper and educational legislation. The prevailing teacher conception was essentially that which dominated the knowledge of the discipline that was to teach and the techniques necessary to guarantee the learning (AYRES; SELLES, 2012, p. 98).

With the enactment of Law nº 4.024/61, the first LDB of Brazil, in its article 59, it was defined that the Teachers' training to act in the secondary education (School - equivalent to today's elementary and high school) faculties of philosophy, sciences and letters (BRASIL, 1961), there is no innovation in the locus of teacher training, higher education as described in article 67, “will be taught in establishments, whether or not grouped in universities, with the cooperation of research institutes and vocational training centers” (BRASIL, 1961, art. 67).

However, the biggest change that occurred with the publication of the LDB of 1961 was in relation to the teaching of the school discipline “Science” that made it compulsory. Currently, this discipline is part of the school curriculum, not only of all elementary and high school, but it is present in the curriculum even from the initial years of elementary school.

It is noteworthy that the school discipline “Science” had already been included in the last two years of elementary education in the *Capanema* Reform of 1946, however, its obligatoriness only occurred in fact according to Krasilchik (2000) with Law 4.024 - Guidelines and Bases of Education of December 21, 1961. The law substantially increased the participation of the sciences in the school curriculum, from the first year of junior high school. In the high school course, there was also a relevant increase in the hourly loads of the disciplines of Physics, Chemistry and Biology.

According to Ayres and Selles (2012), until then the courses that trained teachers to teach Biology in high school were the Natural Sciences course, but after the school discipline “Science” was included in the elementary school curriculum there was no adequate training

for teachers, since the courses had a strong emphasis on the contents of Geosciences besides the contents proper of Biological Sciences.

This is because the degree in Natural History did not offer disciplines that would prepare future teachers to act in the first cycle. Even the changes that gave rise to the degree in Biological Sciences in 1963 did not fully account for the specificity of science teaching in this cycle. The teaching license in Biological Sciences, therefore, established more evident links with the propaedeutic characteristics of scientific education in the second cycle of secondary to the detriment of the first, which was concerned with a general and integrated introduction to the study of science. Thus, if the problem of initial teacher training was to be tackled in a general way, the first level of education was particularly deficient (AYRES; SELLES, 2012, p. 101).

The main measure taken in relation to teacher training for the new requirements of the discipline “Science”, now also present in the first degree, came with CFE Opinion 81/1965 of the Federal Council of Education that officially created the Short Degree in Physical Sciences and Biological to train the teachers who would teach at this level of education, also prescribing the curriculum of this undergraduate course. The Federal Council of Education denominated these courses of “First Degree Education License” (BRASIL, 1997).

These courses, also known as short-term teaching license degree, were created with the aim of training teachers not only to teach sciences, but also mathematics in junior high school, bringing the idea of a multipurpose teacher (to be maintained in the following decade), which would be qualified to teach in both disciplines. They were characterized by having a lower hourly load compared to Natural History courses, which later became Biological Sciences and were created due to the deficiency of teachers that existed at the time, which were supplied by means of proficiency tests, enabling teachers who did not were licensed (AYRES; SELLES, 2012).

However, in 1964, political changes occurred again in Brazil, when the military dictatorship was introduced, making the role of the school change, emphasizing now the formation of the working man, seen as the main element in the search for the development of the economy (KRASILCHIK, 2000). Thus, the project for the creation of the short-term teaching license degree in Sciences of 1965 was abandoned when the dictatorship emerged, with a second edition of this mode of courses, which came to pass with the reforms of LDB/71 (AYRES; SELLES, 2012).

Seeking to train teachers in relative quantities to respond to the growing school community was a major problem that arose during the coup. This was due to the fact that after a new economic model emerged after the coup, the demand for education was greater, leading to the need to expand the education network that would no longer be able to meet this growth. However, as education did not receive investments in the same proportion as the educational system expanded, this fact led to a greater aggravation of the education crisis in the country (NASCIMENTO; FERNANDES; MENDONÇA, 2010).

In Brazil, during this period, many changes were made in educational policy, higher education was modified, creating short courses, although many controversial, in addition, the military supported by the authoritarianism that prevailed in that period and by the so-called

“the Brazilian miracle” prompted Law n° 5.692 LDB/71 to be elaborated and approved, thus creating the guidelines and bases of first and second grade education, reformulating the old primary and secondary education (SAVIANI, 2007).

Law n°. 5.692/71 and the creation of a short-term teaching license undergraduate courses

In 1971, once again, there were changes in Brazilian legislation, Law n°. 4,024/61 was modified for the then referred Law n°. 5.692/71 (BRASIL, 1971). With the new lawⁱⁱ, there were transformations in the first and second grades for the last four grades of elementary school and also for the second grade, foreseeing the formation of teachers at a higher level (undergraduate), which should happen in the short-term teaching license courses (3 years of duration) or full (4 years duration) (SAVIANI, 2009).

This law, among other objectives, aimed at increasing the supply of places in schools for the vast majority of the population, however, the public school suffered a bump in the search for vacancies, as it was not prepared to face the new changes of the law and needed a large number of teachers trained in several areas, mainly the science teacher, the problem was solved with the creation of the short term teaching license courses through Opinion n°. 30/74 by the Federal Council of Education (MAGALHÃES JÚNIOR; OLIVEIRA, 2006).

This decree provided for the creation of a first curriculum of higher education aimed at training teachers specifically for the discipline of Sciences. It is also added that, in the same period, there were several short-term higher education courses of teaching license spread all over Brazil, and the most well-known model at the time was the Bachelor of Science degree (teaching license) that was about two years long. And, if by chance, the professionals who finished this two-year course and would like to have the title of Full Degree (teaching license) (LP), it was necessary to carry out another year of complementation, which could be in the area of Biology, but also in Mathematics, Physics, or Chemistry. This kind of complementation was commonly known as fullness. The possibility of working in high school meant that many teachers sought fullness, because the opinion determined that the teachers would gain by the level of training and not by the field of action, so the teachers who had the plenary could also act at that level of education (MAGALHÃES JÚNIOR; OLIVEIRA, 2006).

Scheibe (2008) explains how it was specific training of science teachers for the first grade through the qualifications by area of knowledge. According to the author, Law n°. 5.691/71 established that undergraduate courses could be offered by means of specific qualifications for secondary education and by means of qualifications by areas of knowledge for the first grade education from fifth to eighth grade. In the specific case of the bachelor's degrees (teaching license), by means of qualifications by area of knowledge for the first degree teachers, which made possible the idea of forming the so-called polyvalent teacher.

The polyvalent teacher was formed on a short-term course and intended to teach only in the final grades of the first grade, which is now equivalent to elementary school. In order

to form this type of teacher, there were propositions of five areas of formation (communication and expression, artistic education, physical education, social studies and sciences), but only three areas of these polyvalent degrees (sciences, arts education and social studies) were in fact instituted. Although officially the short-term teaching license undergraduate courses, which provided the training of the multipurpose teacher, would only be extinguished after the publication of the LDB in 1996, it was already recognized how precarious this type of training had been denounced for at least a decade before (SCHEIBE, 2008).

Krasilchik (2000) points out that the changes that Law 5.692/71 provoked in the first LDB of 1961 had consequences for the area of science education, because it clearly led what would be the modifications in the field of education that would at that time and as a consequence, the recommendations of reforms for the teaching of Sciences. With the enactment of Law n°. 5.692/71, it became evident that scientific disciplines would be affected “now adversely, since they started to have a vocational character, characterizing their function in the curriculum” (KRASILCHIK, 2000, p. 87).

All these changes in Law 5.692/71 aimed at teaching and training of teachers meant that the training of these professionals, which until that moment was limited to some public universities and private institutions, caused an expansion of higher education in the Brazil through private colleges. Short-term teaching license undergraduate courses, now recognized, were created without any control and undisciplined, which further aggravated the situation of teacher training, since among other factors, it also have contributed substantially to de-characterize and devalue education professionals and allowed professionals with a lack of training in various aspects to enter the labor market (KRASILCHIK, 1987).

The exorbitant growth of these courses between the 1970s and 1980s occurred without even discussing which course model was being introduced, which was characterized by the “3 + 1” model. This model remained from the end of the 19th century until the beginning of the 20th century. It is characterized by a being a baccalaureate course in disciplinary area, where it takes only one more year of training in education to obtain the title of licensee, thus enabling the professional to be able to teach in the basic schools. The great problem of this type of teacher training model is that it seeks to centralize the training profile almost exclusively in specific disciplinary knowledge: biologist, physicist, chemist, linguist and not seek to form a teacher for basic education, who will work in his day to day with children and adolescents in development. It ends, therefore, by ratifying fragmentation in isolated courses for the training of teachers (GATTI *et al.*, 2010).

For Magalhães Júnior and Pietrocola (2011), this model was conceived as the first model of higher education course to train teachers and specifically science teachers in reduced time. For Scheibe (2008), this training model clearly symbolized that the pedagogical area in higher education was left in the background and that the baccalaureate was consolidated as a privileged area to which still prevails today.

Due to criticism, this short-term teaching license training model was considered disqualified, and in 1996 a new Law on Guidelines and Bases for National Education (LDBEN - Law 9.394/96) was enacted. The LDB/96 declared the end of the training model,

requiring that the training of teachers of basic education be given in Full-time Bachelor's degree (teaching license) courses (MAGALHÃES JÚNIOR; PIETROCOLA, 2011).

The promulgation of LDB 9.394/96 and the private initiative as locus for teacher training

The issue of the separation of theory and practice was one of the strongest issues that arose in discussing teacher education during the 1970s and 1980s. Moreover, the lack of a link between content disciplines and pedagogical disciplines, a dichotomy between bachelor's degree and undergraduate courses (teaching license), the disarticulation between training in the academy and the reality of the classroom were some of the major dilemmas and questions that contributed to the criticisms that have emerged about the fragmented model of teacher education (DINIZ-PEREIRA, 2016).

When it was approved in 1996, the new LDB brought up again debates in the academic world that sought to focus on the issue of teacher training in undergraduate degrees (teaching license). Thus, without a doubt, this law was responsible for resuming the debate about the training of education professionals in the country (DINIZ-PEREIRA, 2016). According to Saviani (2009), educators hoped that after the end of the military regime in Brazil, the issue of teacher training would be easier to conduct, but the new law, because of many shortcomings and ambiguities in their writing did not respond to this expectation of educators.

Article 61 of the law at the time of its publication brought the formation of education professionals in order to meet the objectives of the different levels and modalities of teaching and the characteristics of each stage of the student's development would be through several fundamentals, among others, the association between theories and practices, including through in-service training and the use of previous training and experiences in educational institutions and other activities (BRASIL, 1996). According to Scheibe (2008), these norms and regulations after the new LDB/96 expressed an intention to implement a model to train teachers that would not be related to a university education, characterizing such a model with a technical-vocational preparation.

Another aspect that has had great discussion after the new law refers to the locus of teacher training. The institutes of education established in our country were created based on models of training of teachers of other countries, becoming the great novelty to train the new teachers. Such institutes that normally offer the majority of short-term teacher training programs, considered to be faster and cheaper, actually served as a possibility for pedagogy and teaching license courses, which were previously offered regularly at universities (DINIZ-PEREIRA, 2015b).

Article 62 of the LDB/96 established that the training of teachers to teach in basic education would be given at a higher level by means of a Full-time bachelor's degree (teaching license) course and defined where such formation could occur that would be according to article of the law "in universities and institutes as a minimum training for the

exercise of teaching in early childhood education and in the first four grades of elementary school, offered at the intermediate level in the Normal modality” (BRASIL, 1996, art. 62).

According to Saviani (2009), the new law paved the way for the Higher Education Institutes (ISE) and the Higher Normal Schools as a place to hold pedagogical and teaching license courses, so the law signaled a policy of teacher training which would see them leveling out, in other words, such higher education institutes have emerged as second-tier higher level institutions, promoting smoother and cheaper training through short courses.

In a short time, what was seen was the exorbitant increase of countless private institutions that in most cases were not recognized for offering teaching license courses in their structure. After the law, they became institutions that took responsibility for training teachers of Brazilian basic education in large numbers. In these private institutions, which can be called “university-companies”, the enormous difficulty they have in educating qualified education professionals to work in the most numerous areas of school knowledge, especially in the areas of natural sciences (biology, physics and chemistry), since in these university-companies what is spent to maintain a course is what will determine if this area of the course will be privileged in relation to the other areas (DINIZ-PEREIRA, 2015b).

Therefore, after the enactment of LDB/96, the courses that aimed to train teachers for the teaching of public education were greatly expanded in higher education in Brazil, particularly through private institutions, through the ISE (SCHEIBE, 2008; SAVIANI, 2009; DOURADO, 2015; DINIZ-PEREIRA, 2016). Although it was not forbidden to university institutions to organize courses in order to train the teachers in their interior, according to Diniz-Pereira (2016), the ISE were intended as a locus of teacher training that should work outside the universities.

This conjuncture tried to de-responsibility the public universities and the courses of pedagogy as main locus to train the teachers of the basic education. Moreover, the exorbitant growth of shorter courses of initial training that do not have quality criteria, particularly distance education courses, was mainly aimed at increasing the number of higher education statistics, especially in the teaching profession, bringing enormous consequences for the dismissal of the identity of the professionals who work in the teaching profession (SCHEIBE, 2008). Still in the author's understanding:

The training programs implemented by these new instances and educational forms simplify the pedagogical work and disfigure the identity of teachers' professionals, overlapping with the already existing and little expanded training structure of Brazilian universities. A solid university education for teachers, widely claimed, came tacitly, being procrastinated by public policies, privatization of higher education, and lack of accountability for effective mass education (SCHEIBE, 2008, p. 49).

According to Saviani (2005), LDB/96 excelled because we missed the possibility of marking yet another crucial moment in the history of teacher education in Brazil, adding:

We can therefore conclude that the hopes placed on the new Law of Directives and Bases of National Education, embodied in Law nº. 9.394 of 20 December 1996, in order to successfully address the problem of teacher training, were frustrated. In effect, aborted legal device that would raise the preparation of all teachers at the

higher level; and considering that the innovation of higher education institutes represents a strong risk of leveling down (SAVIANI, 2005, p. 25).

According to Diniz-Pereira (2016), one of the conclusions reached is that both public universities and other Higher Education Institutes (HEIs) needed to reflect on the model of teacher training that was underway in their institutions and that they would have to look for a “new institutional culture of teaching licenses” (DINIZ-PEREIRA, 2016, p. 148). A new type of institutional culture would be related to the notion that such courses aimed at teacher training would have to be understood as a competence of universities, particularly public universities, to respond qualitatively to the problems presented by the political, economic and social conjuncture at the time. It would thus be the responsibility of the public universities to assign the challenge and social commitment of a differentiated formation of the teachers of basic education, so that they could become agents of change in the Brazilian basic school.

Modifications were proposed and approved by the Federal Council of Education for the training institutions and the courses that formed the teachers after the publication of the LDB of 96, example of the Curriculum Guidelines for Teacher Training in 2002 and soon after the Curricular Guidelines individually for each teaching license course. However, for Gatti (2010), even if such adaptations occurred due to the new guidelines, what happened was the predominance of the historical idea in undergraduate courses to train teachers with a focus on the specific disciplinary area and little space for pedagogical training. Still according to the author, a new century began, in which the conditions of teacher training in the disciplinary areas already counted on the orientations seeking to integrate the disciplinary training and teacher training, but what was observed in practice was the predominance of the model recognized in the early twentieth century, for teaching license degrees.

In any case, what happens is that the training of teachers for basic education is done, in all types of teaching license programs, in a fragmented way between the disciplinary areas and levels of education, not counting Brazil in higher education institutions, with a faculty or institute of its own, a trainer of these professionals, with a common training base, as observed in other countries, where there are teacher training centers encompassing all specialties, with studies, research and extension related to didactic activity and reflections and theories associated with it (GATTI, 2010, p. 1358).

Current changes in LDB 9.394/96, educational policy and the retrocess for teacher training

When analyzing the current LDB (BRASIL, 2017a) in relation to the text originally published in 1996, it is noticed that it has undergone many changes. The law is completely marked by the withdrawal of articles and subsections and also by the modification and inclusion of new ones. However, the main changes made in the law with regard to teacher training came more recently in 2017 after the announcement of the reform of High School proposed by Provisional Measure (MP) n° 746/2016, later approved as Law 13.415/17 (BRASIL, 2017b) by modifying the LDB. The main change to the basic school curriculum happened concerning his art. 36, which reads as follows:

The high school curriculum will be composed of the National Curricular Common Base and formative itineraries, which should be organized through the provision of different curricular arrangements, according to the relevance to the local context and the possibility of the education systems (BRASIL, 2017a, art. 36).

What stands out in relation to the curriculum was especially the extinction of the compulsory subjects of Sociology, Philosophy, Arts and Physical Education (FERRETI; SILVA, 2017; CUNHA, 2017). Analyzing from an educational perspective, with “MP” 746/2016 and with the National Curricular Common Base (*Base Nacional Comum Curricular* – BNCC), the formation of competence that was no longer valued in the Lula government (FERRETI; SILVA, 2017) is resumed, as well as the old conception of that the High School prepares some for Higher Education and others for training for work (CUNHA, 2017). For Motta and Frigotto (2017), the urgency of the High School Reform aims to manage the social issue and deny the foundations of science that enable young people to understand and master how the world of things and human society works.

Regarding the training of teachers, the focus of this text, the main amendment of the “MP” n°. 746/2016, concerns art. 61 of the LDB/96, especially by including the following subsection:

IV professionals with notorious knowledge recognized by the respective education systems, to deliver contents of areas related to their training or professional experience, certified by specific degree or teaching practice in educational units of the public or private network or private corporations in which they have acted, exclusively to comply with item V of the caput of art. 36 (BRASIL, 2017a).

In this sense, the possibility of assigning the exercise of teaching to people with “notorious knowledge” is highlighted, that is, the new teachers do not need a scientific and pedagogical formation to act in education according to new law. For Silva (2017), this paragraph does not take into account that in order to improve the quality of education it is necessary for education professionals to have a solid theoretical and practical training guaranteed especially through higher education courses, when determining that to act as a teacher is not specialized training is required, and it is sufficient that the education system attest to the hypothetical notorious knowledge.

According to Cunha (2017), the rationale for explaining the educational policy expressed in Provisional Measure n°. 746/2016 is not exactly in High School, but in Higher Education, just as occurred in the reforms of the 1970s and 1990s, explores this hypothesis through two strands: the first refers to the crisis of the expansion of the private sector of Higher Education, which was already happening since the second Dilma government; the second would be the intensification of this crisis already in the Temer government, which was mainly happening due to the narrowing of government financing. Thus, the containment of the demand for Higher Education is what explains the Provisional Measure n°. 746/2016 “complemented with the reduction of student financing through FIES, in terms of resources/vacancies and transfer to private institutions of the financial expenses previously assumed for the government” (CUNHA, 2017, p. 383).

However, shortly after the proposal of MP n°. 746/2016, the Ministry of Education (MEC) launched at the end of 2017 the new National Policy for Teacher Trainingⁱⁱⁱ, which

has among other objectives, to create a National Teacher Base to guide the curriculum of teacher training, as well as the BNCC in High School and the Pedagogical Residence Program (*Programa Residência Pedagógica - PRP*) and the proposal to modernize the existing Teaching Initiation Grants Program (*Programa Institucional de Bolsas de Iniciação à Docência - PIBID*).

The Coordination for the Improvement of Higher Education Personnel (*Coordenação de Aperfeiçoamento de Pessoal de Nível Superior - Capes*) in 2018 has issued notices 06/2018 and nº. 07/2018 to present proposals for such programs, which starts from the so-called “new teacher education policy”. In this sense, the National Association of Post-Graduation and Research in Education (*Associação Nacional de Pós-Graduação e Pesquisa em Educação - Anped*), together with other associations of research in education, opposed the policy of teacher education (ANPEd *et al.*, 2018).

The main question raised about the PRP in point one of the text of the ANPEd (pedagogical residence, becomes a stage in its more conservative sense: retaking the old formula), refers to the fact that it has a trait character in a conservative format and traditional, being the moment when the students come into contact with the practice or the “hour of practice” and that, although the pedagogical residence in its terminology proposes the entrance of students still in formation in the practice of teaching. In reality, the program indicates a more punctual entry of students into schools, reaffirming even more the hierarchy and exclusion relationship between theory and practice, as well as university and school, not stimulating democracy and solidarity that are of fundamental importance in the formation and in the practice of future teachers (ANPEd *et al.*, 2018).

Another question raised in the text is that the practical dimension of learning in teacher training was emphasized in the PRP announcement, separately from the responsibility of providing teachers with a moment of analysis and awareness raising about their own practice, which ends up depriving the teacher of his own idea of what should be a pedagogic residence, thus retaking the old model of observation, participation and regency in the classroom, not taking into account the immense field of debate about teacher training, since it silences a training that favors reflexivity (ANPEd *et al.*, 2018).

Regarding the linking of these notices to the BNCC, other educational entities had already been positioned contrary to the standardization and control imposed by the PRP, since the association of these programs with the BNCC is characterized by the narrowing of the curriculum and by hurting “university autonomy by inducing in IES institutional training projects that disregard the conceptions of teacher training present in their own pedagogical projects”, incurring a reductionist view of teacher training, as it limits teacher training ‘in doing’ that is not committed to a socio-historical conception of emancipation (ANPEd *et al.*, 2018).

Still within this context of retrogression in the educational policy, it is possible to mention the Constitutional Amendment nº 95 (EC 95) of December 15, 2016, that instituted a New Fiscal Regime in the country. PEC 241 known as PEC of Death means in practice the budget freeze on health, education and social assistance for 20 years, which extends until 2036, which in the field of education will cover the period of the National Education Plan

(*Plano Nacional de Educação - PNE 2014-2024*) approved in June 2014 and also the period of the next PNE from 2025 to 2035, therefore PEC 241 determined the death of PNE (2014-2024) (AMARAL, 2016).

Paradoxically and in opposition to this discussion, we had in 2015 the approval of the New National Curricular Guidelines for the Initial and Continued Formation of Professionals of the Magisterium of Basic Education, Opinion CNE/CP 02/2015 (deserves attention in isolation and does not fit into the discussion of this work by space limit^{iv}) that according to Dourado (2015) the objective was to ensure a greater organicity for the initial and continuing training courses of teachers who will work in basic education.

Final considerations

Throughout this article, we sought to understand how the Laws of Guidelines and Bases of National Education (considered here, Laws 4.024/61, 5.692/71 and 9.394/96 and current changes occurred) included the training of Science and Biology teachers, from a historical perspective. In other words, the aim was to understand how educational legislation has, throughout history, punctuated issues related to teacher training in this specific area.

From this perspective, it has been identified that in the course of approximately 50 years, despite the increasing (political) measures for teacher training, this is an area that remains lacking, especially when considering specific areas of knowledge (natural sciences and exact sciences).

Regarding the main problems identified, it is worth noting that at first there is a historical inheritance in the licentiate course of Biological Sciences characterized as appendix of the baccalaureate, also going back to the “3 + 1” training model created by USP in 1934, in second; this model separated in two fields the knowledge that was necessary for the formation of teachers, the specific knowledge related to the scientific-cultural world and pedagogical knowledge focused on didactic and professional formation.

Thus, several generations of Brazilian teachers and scientists were formed within this model that was directed to specific areas and; therefore, culminated that to this day there is still a tension between the bachelor’s degree and undergraduate courses (teaching license), at Brazilian universities. Another major problem identified refers to the poor quality of undergraduate courses for teacher training due to the expansion process undergone by higher education, both with Law 5.692/71 and the creation of Short Degrees to meet the demand for schooling but also, especially after LDB/96. In the last analysis, it is important to highlight the current changes in the LDB that are moving backwards in the field of teacher training, attesting to the possibility of assigning teaching to people with “notorious knowledge”.

Due to these problems, it is understood that they are responsible for important implications in the initial training of Science and Biology teachers. Due to the historical heritage of the licentiate course of Biological Sciences of the “3 + 1” model, there was therefore no identity of the profile of science and biology teacher that would be being formed to work in basic education, but rather by the professional biologist, which de-characterizes

the professional profile of “teachers” in this area education; as this model divided the knowledge needed to train teachers in two areas, it entailed increasing the fragmentation of the necessary knowledge in the initial training of teachers in the undergraduate curriculum, since the course aims to centralize training almost exclusively in specific disciplinary knowledge, in the case of the area of Sciences and Biology, in only biological knowledge.

Teaching license courses created to train teachers after LDB of 1996, mainly via private initiative in the “university-enterprise”, promoted a lighter and cheaper training medium short courses and more resembled a technical-vocational preparation, not bringing the desired changes in the initial training of teachers since the 1980s. Thus, the absence of a specific training locus for primary education professionals (which should be primarily in public universities) involved thousands of trained teachers (who should be change in basic education) in a disqualified way that were to act in the teaching profession, specifically the professors of the natural sciences (biology, physics, chemistry) which hampered the learning of this area of knowledge.

There is an understanding, therefore, that in order to improve the quality of teaching in this area, it is also necessary to improve the initial training of teachers without, of course, drawing attention to other real problems that directly affect teaching and the quality of teaching such as career plans, salary of teachers of basic education, autonomy and working conditions in schools.

The current changes in the LDB/96, specifically the changes in article 61, attesting to the possibility of assigning the teaching profession to people with “notorious knowledge”, indicates that there is no need for an academic formation to act as a teacher, which should be taken a lot of attention, especially in the context of the new BNCC and the current conjuncture that the educational policy in Brazil is taking for teachers training. In view of all these notes, we agree with Diniz-Pereira (2015a, p. 144) when he states that:

It will not be education, much less teacher training, the only ones capable of transforming society. The transformation of society - not that of maintaining the same structures that feed social and economic inequalities - towards a fairer, more humane and more egalitarian society cannot, however, give up the important role of education and teacher training.

Finally, the relevance of recourse to legal texts is pointed out, since the way education - and, in this specific case, teacher training - is addressed in legislation, also reveals the importance attributed to this field by social group as a whole. In this sense, it is considered that the desired social changes must be directly involved with investments in education, especially with the appreciation of teachers. However, it is also essential that efforts be made to address urgent issues such as economic and social inequalities.

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Notes

ⁱ This text is part of a chapter of the theoretical foundation of master's thesis of the first author that is in progress.

ⁱⁱ This law modified through amendments and articles the first LDB of 1961 and was replaced by LDB 9.394/96 not being considered a “second LDB”.

ⁱⁱⁱ Available in: <http://portal.mec.gov.br/ultimas-noticias/211-218175739/55921-mec-lanca-politica-nacional-de-formacao-de-professores-com-80-mil-vagas-para-residencia-pedagogica-em-2018>. Accessed on: September 29, 2018

^{iv} See text by Professor Luiz Fernandes Dourado CNE/CP 02/2015 rapporteur.

