pro-posições
e-ISSN 1980-6248
http://dx.doi.org/10.1590/1980-6248-2017-0199

ARTIGOS

Considerations on Brazilian Teacher Training Indicators[1]

Considerações sobre os indicadores de formação docente no Brasil[2]

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Abstract:
In this paper, we analyze the data from Instituto Nacional de Estudos e Pesquisas Educacionais Anísio Teixeira/Ministério da Educação on teacher training in Brazil. The data selected for analysis were taken from the synopses provided between 2001 and 2015 and comprise the number of available places, admissions and graduates by undergraduate courses. From the data analysis, we can observe that the number of places available at universities has increased during the period, but teacher-training courses still present low demand and many unfilled places. Physics courses have the lowest number of graduates compared to other courses analyzed. This reality may be influenced by many factors such as high evasion rate and low demand for teacher-training courses.
Keywords: teacher education, teacher-training courses, higher education, evasion

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pro-posições
e-ISSN 1980-6248
http://dx.doi.org/10.1590/1980-6248-2017-0199

Resumo:
Neste artigo buscamos analisar e tecer algumas considerações a respeito dos indicadores divulgados pelo Instituto Nacional de Estudos e Pesquisas Educacionais Anísio Teixeira/Ministério da Educação sobre a formação de professores nos cursos de licenciatura no Brasil. Os dados selecionados para análise e discussão foram retirados das sinopses estatísticas fornecidas entre os anos de 2001 e 2015 e compreendem o número de vagas oferecidas, de ingressos e de concluintes por cursos de graduação. A partir da análise dos dados, podemos observar que, embora o número de vagas tenha aumentado no período, os cursos de licenciatura ainda apresentam baixa procura e muitas vagas ociosas. Os cursos de Física têm o menor número de concluintes em comparação com os outros cursos analisados. Essa realidade pode ser influenciada por diferentes fatores, entre os quais a baixa procura por cursos de licenciatura e a alta taxa de evasão.
Palavras-chave: *formação de professores, licenciatura, ensino superior, evasão*

Introduction

In the past decades – especially since 1990 –, there has been some political and social reforms connected to suggestions and strategies for education worldwide from multilateral bodies, such as the World Bank, the International Monetary Fund, and the Organisation for Economic Co-operation and Development (OECD), which have mainly targeted developing countries (Ferreira, 2011; Maués, 2011; Mazzeu, 2009; Shiroma, Moraes, & Evangelista, 2007; among others). The recommendations of these multilateral bodies for education and, in this particular case, for teacher training, are present in the policies of many countries, including Brazil, despite the resistance of some social movements and academic entities. They are compensatory actions that, instead of solving the lack of teachers, end up aggravating even more the training problem, the work conditions, the insertion and permanence of teachers in the profession.

Considering the lack of graduated teachers in Brazil and, in synch with the educational reform that has been drawn since 1990, a commission established by the *Conselho Nacional de Educação/Ministério da Educação* (CNE- National Educational Council/MEC- Ministry of Education) wrote in 2007 the report *Escassez de professores no Ensino Médio: propostas estruturais e*

pro-posições
e-ISSN 1980-6248
http://dx.doi.org/10.1590/1980-6248-2017-0199

emergenciais (Lack of High School teachers: structural and emergency proposals), with a compilation of data released by the *Instituto Nacional de Estudos e Pesquisas Educacionais Anísio Teixeira* (Inep- National Institute of Educational Studies and Research Anísio Teixeira/MEC),by the *Confederação Nacional dos Trabalhadores em Educação* (National Confederation of Education Workers) and by OCDE (Ruiz, Ramos, & Hingel, 2007). The deficit presented by the report in that year was of 479,906 teachers for the final years of elementary education and 246,085 teachers for high school. Thus, 746 thousand teaching job positions needed to be open in the country. However, the same document presented alarming data on teacher training, showing the high level of drop-out in teacher-training courses, especially in the areas of Physics, Chemistry, and Mathematics, as well as the low number of teachers graduated in these courses (Ruiz, Ramos, & Hingel, 2007).

Having this scenario as a base, the report presented some emergency solutions to fulfill the need of K12 teachers, such as incentives for retired teachers to return teaching the subjects with more demand for graduate teachers; the prolongation of retirement of high school teachers– through fiscal and financial incentives; the hiring of professionals with no teacher-training as K12 teachers; the hiring of foreign teachers for specific subjects; the creation of scholarship programs for public high school graduates to study a teaching-training course in private universities; the complementary use of virtual classes, especially for subjects in high school; and the work of teacher-training students as teachers, as an emergency action, though scholarships to incentivize teaching (Ruiz, Ramos, & Hingel, 2007).

Some of those recommendations were adopted and incorporated to Brazilian educational policies (Ferreira, 2011; Maués, 2011; Mazzeu, 2009; Shiroma et al., 2007) continuing until now, and can be observed in the current reforms proposed for K12 education. Different federal programs have been created to try to solve – or dissimulate – the problem of teacher training in the country, many of those punctual and/or as an emergency. However, as argued by Freitas (2007), the lack of K12 teachers pointed out by the CNE report cannot be characterized as an exclusively emergency problem, but as a chronic one historically produced by the withdraw of the State's responsibility to maintain a public, free, and good education, as well as the training of teachers. For the author, far from dealing with the lack of K12 teachers towards a policy that values teacher training, the alternatives proposed by the report can lead to the softening and flexibilization of this training.

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e-ISSN 1980-6248
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With those strategies, the country aims to, simultaneously, fulfill the need of K12 teacher training and draw a policy that adapts itself to the training and work of the teacher to a new society model that tries to establish itself in consonance with international demands. This need to answer the demands of teacher training was intensified with the approval of the Constitutional Amendment n. 59, November 11th, 2009, which rewrites items I and VII of art. 208 of Brazilian Federal Constitution. Such amendment envisions the universalization of school education from 4 to 17 years old, making High School obligatory. With this extension of obligation, there would be the need to hire more K12 teachers.

However, according to audit data done in 2014 by the *Tribunal de Contas da União* (TCU) together with its state counterparts (TCU, 2014), in Brazil there is an estimated deficit of 32,700 teachers with specific training in the 12 obligatory subjects that, so far, are part of the High School curriculum. Physics is the one that lacks more teachers – more than 9,000- and is the only one with a deficit in all states. After, there is Chemistry, with a 15% teacher deficit in 25 states (Deimling, 2014). Among other reasons, these data can be justified by the fact that, according to Gatti & Barreto (2009), when graduating those courses, students often find better work offers than teaching. The data presented by this TCU audit pair with the ones presented by CNE in 2007 and highlight the shocking lack of K12 teachers.

Considering all these aspects, in this article we aim to think some consideration on the indicators released by Inep/MEC on teacher training in specific university courses in Brazil, having as a base the number of teacher-training courses and positions offered, as well as students entering (freshmen) and graduating. For this analysis, we also consider some important studies and researches on the theme which discuss, among other aspects, the impacts of those political reforms in teacher training and career in Brazil.

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e-ISSN 1980-6248
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Method and procedures

This work is based on a quantitative- qualitative research method, in which statistic data are used as a base for the description, analysis, and interpretation of results. The data presented and discussed in this article are part of the synopses released yearly by Inep (2017) which present information on all undergraduate courses- bachelor, teacher-training, or technology. The data selected to be analyzed in this work were taken by the synopses released between 2001 and 2005 and encompass the following indicators: (i) number of places offered and students enrolled through *vestibular* and other selective processes, in presential and distance undergraduate courses, and (ii) number of graduates, by presential and distance undergraduate courses.

Some data presented by Inep categorize undergraduate courses in groups and subgroups. As the aim of this article is to draw a brief analysis of the scenario of teacher training in Brazil, we opted to work only some data referring to the subgroup "Teacher training in specific subjects", within the group "Education". The choice for this subgroup is justified by the high deficit level of teachers with specific training in the 12 obligatory subjects on High School curriculum, as shown by the previously presented TCU data (TCU, 2014). We selected for analysis the data related to the teacher-training undergraduate courses in Biology, Philosophy, Physics, Geography, History, Letters, Mathematics, and Chemistry. Thus, when we mention "teacher-training courses", we refer to the data of those 8 courses. This selection was done considering all the courses in this subgroup which had all their data made available in all the synopses in the time period established by the research.

The information regarding the Letters course are presented together – contrary to the original spreadsheets released by Inep. This organization was needed due to the different names used in the synopses throughout the years. For example, in 2014, the data is presented in six categories- (i) Letters, (ii) Linguistic, (iii)Classic Foreign language/literature, (iv) Modern foreign language/literature, (v) Vernacular language/literature (Portuguese), and (vi) Vernacular language/literature and modern foreign language. The second and third presented in 2014 were not used in this synopsis. Therefore, considering the naming alterations in the synopses, that have also taken place in other synopses, we opted to group the data present in 2014 naming it "Teacher training in Letters".

The research results are presented as such: (i) data of teacher-training courses selected per year; (ii) data of all the other courses (all courses, except the selected teacher-training ones)

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e-ISSN 1980-6248
http://dx.doi.org/10.1590/1980-6248-2017-0199

per year; (iii) specific data of teacher-training courses in Physics per year; and (iv) comparison between courses, considering the values obtained in all 15 years analyzed. From these data, we defined the indicators "occupation rate of available places" (ratio between the number of freshmen and the number of places) and "ratio freshmen/graduates". The data was analyzed and discussed through the lenses of some important studies and researches done in the last years on the theme. This analysis considered relevant aspects to the discussion of possible causes of the lack of teachers and high drop-out levels in teacher- training courses in Brazil.

To present the data, we used some abbreviations in the text and figures. Regarding the modality of education, we used the letter P to refer to presential courses, the letter D for distance education. The sum of presential and distance education is represented by the letter T (total). Places, freshmen, graduates, and Occupation rate are respectively represented by Pl, F, G, F/Pl, Consequently, we also have the following abbreviations: presential places (PPl), distance places (DPl), total number of places (TPl), and total occupation rate (TF/TPl).

The data presented by the letters TT indicate data referring to the total data related to all teacher-training courses selected for this work, through the 15 years of analysis. Therefore, we used the abbreviations TTPl, TTF, and TTG to indicate all available places in teacher-training, the number of freshmen and the number of graduates in all teacher-training courses selected from 2001 until 2015.

Inep indicators present the total number of places, freshmen, and graduates of all courses considering all the modalities in the synopses (teacher-training, bachelor, and technologies). Aiming to broaden the analysis, from these numbers we subtracted the numbers referring to the selected teacher-training courses, named "other courses". Thus, for example, FOC means "freshmen of other courses".

As the absolute values of the data of the "other courses" group is much higher than the "selected teacher-training courses" group, the number of places and freshmen were normalized by their respective number presented in 2001 aiming to compare the behaviors of the analyzed variables. These normalized data are indicated by a lowercase "n" in the end of the data abbreviation. For example, FOCn represents the normalized number of freshmen in other courses.

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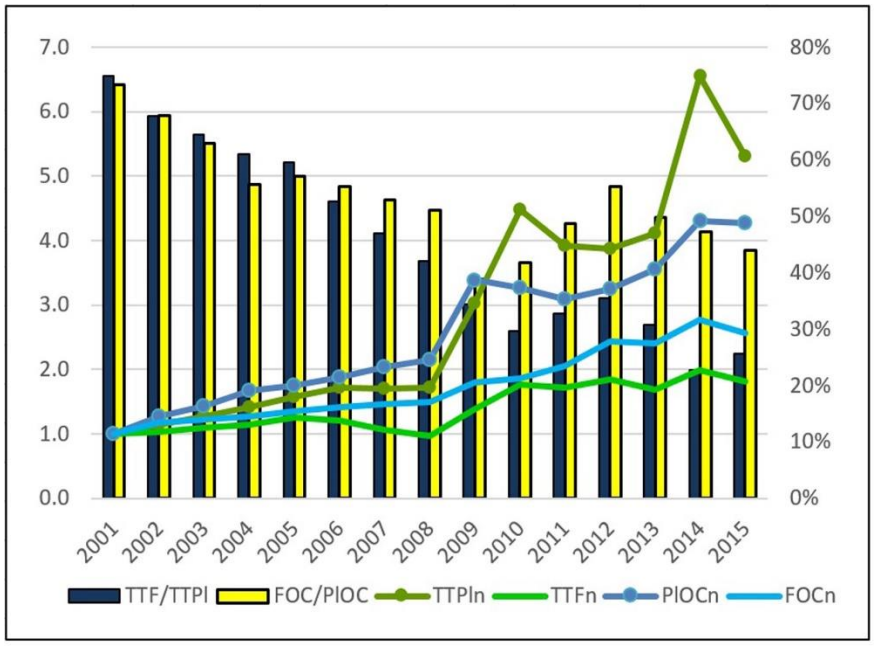
e-ISSN 1980-6248
http://dx.doi.org/10.1590/1980-6248-2017-0199

Results and discussions

Considering the objectives of this study and the theoretical reference that guides it, we present in this item the analysis and discussion of indicators made available by Inep on the training of teachers in Brazilian teacher-training courses.

Figure 1 shows the number of freshmen, the number of places and their occupation rate in the selected teacher-training courses and other courses, considering presential and distance education.

Figure 1 – Behavior of occupation rate, number of places, number of freshmen in selected teacher-training courses and on other courses, 2001-2015



Note: left axis: places and freshmen in the selected teacher-training courses (TTPln and TTFn) and places and freshmen in other courses (PlOCn and FOCn), both normalized in relation to 2011; right axis: occupation rate of on selected teacher-training courses (TTF/TTPl) and on other courses (FOC/PlOC).
Source: created from Inep (2017).

Generally, we can see that in both cases the occupation rate of higher education courses has decreased since 2001. This reduction is basically continuous until 2009. There was an increase only between 2010 and 2012, followed again by a decrease.

Analyzing both groups, it is possible to affirm that the occupation rate of places in the selected teacher-training courses was higher than in other courses between 2001 and 2005, with an average of 65% to 62% of places occupied, respectively. However, between 2006 and 2015

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e-ISSN 1980-6248
http://dx.doi.org/10.1590/1980-6248-2017-0199

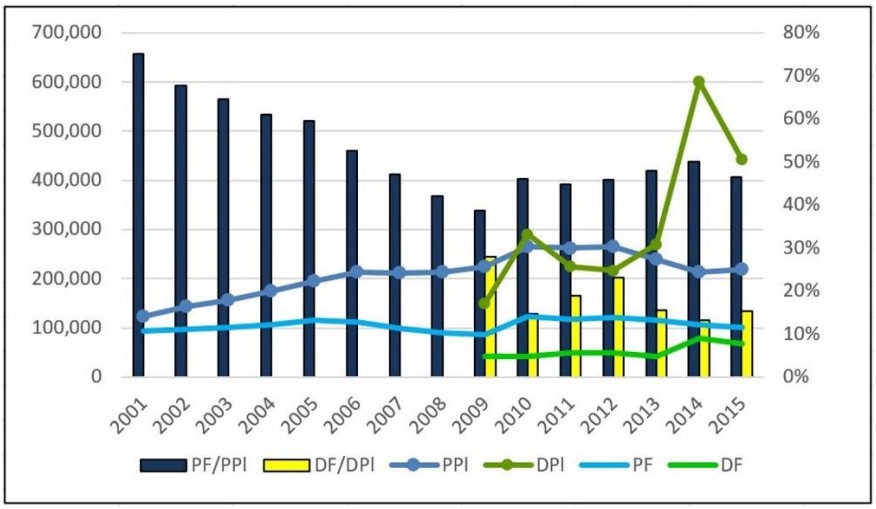
we see an inversion. The selected teacher-training courses only had 32% of their places filled, while other courses presented a 48% rate.

On the number of places, we can see that, proportionally, the selected teacher-training courses had a higher increase, mainly since 2010. Before this growth it was slightly smaller. However, analyzing the number of graduates, there was little alteration in this group. In the other courses, the growth in the number of places was less intense, but the number of freshmen had an increase of approximately 30% between 2010 and 2015.

Considering that the demand for the selected teacher-training courses was constant and that the total number of freshmen has increased, we can imagine that these courses had become, since 2006, the ones favored by students in general. That is, these data show that the other courses, mostly bachelor and technology, are been chosen by most freshmen.

In Figure 2 we present the numbers by the type of teaching modality- presential and distance- only for the selected teacher-training courses.

Figure 2 – Behavior of occupation rate, number of places, and number of freshmen in the selected teacher-training courses, according to the modalities of teaching (presential and distance), 2001-2015



Note: left axis: presential places (PPl), distance places (DPl), presential freshmen (PF), distance freshmen (DF); right axis: occupation rate of presential places (PF/PPl) and distance (DF/DPl). All data refer to the selected teacher-training courses.

Sources: created from Inep (2017)

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e-ISSN 1980-6248
http://dx.doi.org/10.1590/1980-6248-2017-0199

Analyzing the data, Figure 2 shows that, in general, there was an increase in the number of places offered in the analyzed years. If we add both modalities, the number of total places in 2015 has increased approximately 432% in relation to 2001, more than 5 times the value of 2001. This fast growth in the number of total places, especially since 2009, can be justified by the expressive number of places in distance courses between 2009 and 2015. Between 2001 and 2015, PPl increased 76.0%, in 2015 the DPl corresponded to 41.2% of the TPl. If we limit the data between 2009 and 2015, we see that there was virtually no changes in this modality, the variation was of approximately 195%. Considering that the data related to Distance Education (DE) started to be released only since 2009, it is an extremely significant increase of this teaching modality compared to the number of places in presential courses, when analyzing a longer period. In 2009, the DPl corresponded to 40% of the TPl, however, since 2013, distance courses started to offer more places than presential ones. In 2015, for instances, the DPl corresponded to 66.9% of all places offered in that year.

Besides the insertion of data on DE courses in the synopses since 2009, another factor that may have influenced this scenario refers to the public policies to create and increase the number of places in public Higher Education institutions, created by the Federal government in the last 10 years. An example is the *Programa de Apoio a Planos de Reestruturação e Expansão das Universidades Federais* (Reuni- Program to support restructuring and expansion plans of federal universities), established by the Decree nº 6.096, on April 24th, 2007, which allowed the creation of new Higher Education institutions and established an agreement with the existing ones to increase the places in undergraduate courses. In this period, Reuni, together with the *Programa de Financiamento Estudantil* (Fies- Program for Student Funding) and the Law nº 12.711/2012 (about quotas to enter public universities)– also created at the time–, was responsible for an impressive increase in the number of places available in Federal Higher Education institutions, as well as the creation of Federal universities and institutes in all the country.

The occupation rate in the presential modality was of 50.9%, during the 15 years and, in the period 2009-2015, the occupation rate was around 45.6%, much higher than the DE modality which had around 17% of places occupied. This difference between both modalities is justified by the fact that DE courses (among the selected teacher-training courses) had offered more places. However, we can see by Figure 2 that the number of freshmen is still lower than in presential courses. Thus, there is a higher number of empty places in DE (83%) than in presential education (54.6%).

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e-ISSN 1980-6248
http://dx.doi.org/10.1590/1980-6248-2017-0199

Another important point is the number of graduates in these selected courses in during this v15-year period. This data is presented on table 1, distinguished by education modality.

Table1 – Number of places, freshmen, and graduates in the selected teacher-training courses, 2001-2015

Year	TPl	TF	PG	DG	TG	TG/TFTT
2001	123,996	93,012	32,052	-	32,052	34.5%
2002	142,558	96,656	48,217	-	48,217	49.9%
2003	157,080	101,427	56,830	-	56,830	56.0%
2004	175,492	107,210	62,552	-	62,552	58.3%
2005	195,614	116,545	71,562	-	71,562	61.4%
2006	213,987	112,530	68,666	-	68,666	61.0%
2007	211,006	99,348	65,074	-	65,074	65.5%
2008	213,964	90,032	63,833	-	63,833	70.9%
2009	374,717	128,953	62,488	19,908	82,396	63.9%
2010	555,455	164,874	71,175	21,484	92,659	56.2%
2011	486,582	159,854	67,063	17,523	84,586	52.9%
2012	480,956	171,190	61,316	16,284	77,600	45.3%
2013	509,590	157,238	56,587	15,615	72,202	45.9%
2014	813,796	185,667	56,969	19,727	76,696	41.3%
2015	659,370	168,688	58,823	18,957	77,780	46.1%
Total	5,314,163	1,953,224	903,207	129,498	1,032,705	52.9%

TPl: total number of places; TF: total number of freshmen; PG: presential graduates; DG: distance graduates; TG/TFTT: ration of total graduates/total number of freshmen in the selected teacher-training courses[3].

Source: created from Inep (2017).

As the number of places and freshmen in the analyzed teacher-training courses have increased, so have the number of graduates, however, it has increased less. According to Figure 2, the number of freshmen in 2015 has increased 81.4% in relation to 2001, while the number of graduates corresponded to 142.7%, resulting in approximately 1 million graduates in these 15 years. Compared to the Evolution of TF and TG, it is possible to see that the ration TG/TF had behavioral changes during those years (a growth in 2009 followed by a decrease), with percentages always higher than those of 2001.

On the other hand, on Figure 2 it is possible to see that, despite having a significant increase- mainly since 2009-, the places are been less occupied. Between 2001 and 2015, there is a significant increase in the number of empty places. In 2001, this value was of 25%, reaching, in 2015, 74.4% of wasted places. From the data presented, it is possible to see that, during these

[3] Between 2001 and 2008, the data given refers only to presential education.

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e-ISSN 1980-6248
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15 years, more than 5 million places were offered; however, the number of freshmen has not reached the 2 million. This shows that the places offered in the selected teacher-training courses were not been used, thus indicating the need for actions that favor the better use of these Higher Education places.

We cannot deny the fact that, the higher the number of places offered and the higher the number of High Education institutions distributed throughout the country, the higher will be the access of students to different undergraduate courses. However, the numbers presented in this work indicate that, despite the significant increase in the number of places in teacher-training courses, its occupation is lower than expected. As discussed, although it is an achievement, the increase in the number of places in these courses by itself does not guarantee the demand and occupation by students. We can then infer that other factors beyond the number of places offered can influence the low demand of students for teacher-training courses, among which we can highlight the low level of attractiveness and valuing of the teaching career.

Different studies and researches on teacher training (Deimling, 2014; Gatti, Barreto, & André, 2011; Oliveira, 2011; Tardif, 2012; Tartuce, Nunes, & Almeida, 2010) discuss the objective and subjective conditions related to teacher training and career, as well as the influence of those conditions when choosing and continuing in this profession. According to those studies, the complexity of teaching, together with the precariousness of work condition, the sensation of insecurity and lack of support to the profession, plus the low salaries have hindered the social and professional self-esteem of teachers on continuing (or not) in the career, their personal lack of commitment to the profession, and the abandonment of the profession by some acting teachers, as well as by those still in-training.

Among the aspects related to the precariousness of work conditions, the salary issue seems to be one of the most important factors. Vaillant (2006), when analyzing the teacher profession in Latin America, identifies some common points among the different countries in the context: a professional framework that hinders the maintenance of good teachers in the profession; lack of stimuli to see the profession as the first career option; inadequate work conditions; serious problems in the salaries and in the career. According to the author, the salary levels of Latin American teachers are, in general, very low when compared to developed countries, a factor that has hampered the choice of young people for the profession, and the permanence of teachers in the career. The same can be seen by a study done by Louzano, Rocha,

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e-ISSN 1980-6248
http://dx.doi.org/10.1590/1980-6248-2017-0199

Moriconi, & Oliveira (2010), which identifies the importance of teacher training as one of the essential elements of quality in K12 education, indicating that initial career salaries are not competitive compared to other occupations with more financial advantages for High School graduates or even teacher-training graduates. To these low salaries, we can add the low status of the career when compared to other professions which demand the same level of schooling.

Gatti & Barreto (2009), in a study that analyzes teachers' profiles and careers in Brazil, also point out that the initial teacher salary is, in general, low when compared to other profession with the same schooling level, a factor that, together with the lack of professional prestige and the precariousness of work and career conditions, has negatively influenced the demand for this job among young people. In this same study, based on data from the socioeconomic questionnaire of *Exame Nacional de Desempenho de Estudantes* of 2005 answered by teacher-training students, the authors indicated that 65.1% of Pedagogy students (25,625 students) justify their course choice because they wanted to become teachers, while among the students of other teacher-training courses (in specific areas) this percentage is of 48.6% (47,460 students). The authors also show the percentage of students who opt for an academic career instead of K12 teaching. For the teacher-training courses in specific areas, this percentage corresponds to 33.3%, while in the Pedagogy course it is of 31.8%.

Thus, based on studies done and the data analyzed in this study, we can infer that the problem of the lack of teachers in the country is not necessarily related to the lack of places in undergraduate courses. Certainly, the number of places can and should be increased, however the incentive towards the teaching career does not depend only on policies to expand the access to Higher Education, but also improvement on the objective and subjective work conditions and the teaching career, especially in K12 education.

As we can observe, the low demand for teacher-training courses is clear in all the data presented, during the analyzed period. Regarding the teacher-training course in Physics, these data seem even more alarming. On Table 2 and on Figure 2 we present the data on the teacher-training course in Physics, between 2001 and 2015.

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Table 2 –Number of places, of freshmen, and graduates in the teacher-training courses in Physics, 2001-2015

Ano	PPl	DPl	TPl	TF	TG
2001	2,451	-	2,451	2,060	335
2002	3,233	-	3,233	2,273	572
2003	3,190	-	3,190	2,351	744
2004	4,131	-	4,131	2,854	1,048
2005	4,701	-	4,701	2,832	1,199
2006	6,889	-	6,889	3,749	1,270
2007	6,907	-	6,907	3,852	1,342
2008	6,523	-	6,523	3,701	1,223
2009	7,257	4,614	11,871	6,069	1,429
2010	10,630	6,312	16,942	7,884	1,929
2011	9,893	5,677	15,570	8,107	1,981
2012	11,755	4,562	16,317	8,854	2,124
2013	11,231	3,914	15,145	8,378	1,826
2014	9,967	5,479	15,446	9,071	2,085
2015	10,373	3,427	13,800	8,384	1,919
Total	109,131	33,985	143,116	80,419	21,026

PPl: presential places; DPl: distance places; TPl: total number of places; TF: total number of freshmen; TG: total number of graduates

Source: created from Inep (2017).

From Table 2, we can see that during these 15 years there has been an increase in the number of places and graduates in the teacher-training courses of Physics– 463% and 473%, respectively. On the education modalities, considering the whole period analyzed, 23.7% of places and 10.8% of graduates are from DE courses.

If we consider the numeric values only through its evolution, we can see a grown of TPl and TF in Physics courses. However, when we observe the absolute numbers, this balance does not represent a good scenario for the teaching of Physics. Figure 3 shows data on teacher-training courses in Physics regarding the number of places, graduates, and the relation freshmen/places.

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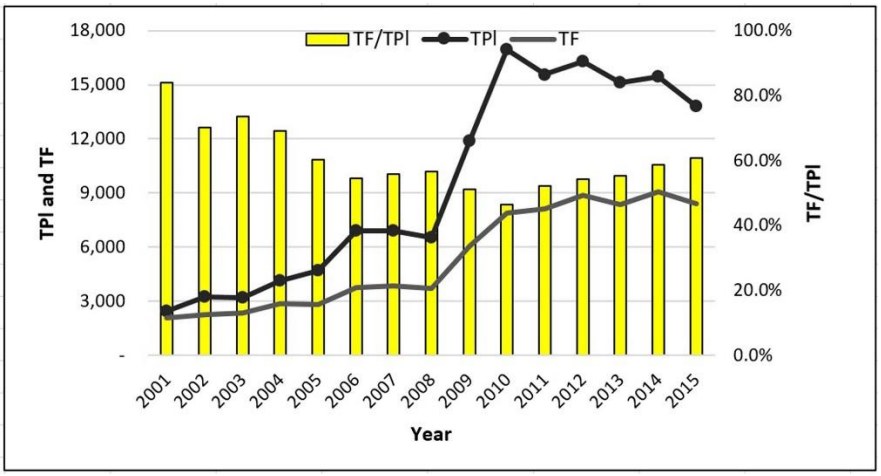
e-ISSN 1980-6248
http://dx.doi.org/10.1590/1980-6248-2017-0199

Figure 3 – Behavior of the occupation rate of places, number of places, and number of freshmen in teacher-training courses in Physics, 2001-2015



Note: left axis (numbers): total of places (TPl) and total of freshmen (TF); right axis (percentage): total occupation of the total of places offered (TF/TPl) in teacher-training courses of Physics.
Source: created from Inep (2017).

As we can see, 2001 was the year with the highest occupation ratio, 84%, and 2010 the lowest one (47% of the total of places). Between 2005 and 2015, the occupation rate varied between 47% and 61%. Observing the curves of places and freshmen, we can see similar behaviors, such as the increase of places in DE courses. We see here the same ratio for this behavior: the number of total places has considerably increased, while the number of graduates has not increased in the same proportion.

To compare the Physics data with the other courses, as well as present the number of places, freshmen, graduates, and occupation rate in each teacher-training course (total values), we also present on Table 3 the participation of each course in the total number of places, adding all the selected teacher-training courses (TPlTT).

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Table 3 – Number of places, percentage of the total number of places, number of freshmen, occupation rate of places, and number of graduates in each selected teacher-training course, 2001-2015

Courses	TPl	TPl/TPlTT	TF	TF/TP	TG
Biology	627,743	11.8%	276,395	44.0%	146,517
Philosophy	137,307	2.6%	58,615	42.7%	27,323
Physics	143,116	2.7%	80,419	56.2%	21,026
Geography	421,740	7.9%	156,870	37.2%	91,787
History	657,783	12.4%	283,919	43.2%	151,651
Letters	2,287,621	43.0%	690,035	30.2%	419,509
Mathematics	853,921	16.1%	307,902	36.1%	139,092
Chemistry	184,932	3.5%	99,069	53.6%	35,800
Total	5,314,163	100.0%	1,953,224	36.8%	1,032,705

TPl: total number of places; TPl/TPlTT: proportion of the total number of places in the course/total number of places in the selected teacher-training courses; TF: total number of freshmen; TF/TP: occupation rate of places, TG: total of graduates

Source: created from Inep (2017).

From Table 3, we can see that the number of places offered in the selected teacher-training course was higher than 5 million, but only 36.8% of the places offered in the period were occupied (column TF/TP). The course with the highest number of freshmen was Letters, which was the one with the highest number of places offered in relation to the number of places (43%), but also the one with the highest number of empty places, with an occupation of only 30.2% (column TF/TP). The course with the highest proportion of used places was Physics, 56.2%, followed by Chemistry, 53.6%. However, these courses corresponded respectively to only 2.7% and 3.5% of the total of places offered.

Figure 4 indicates the participation of each course in the number of freshmen and the total number of graduates in the selected teacher-training courses between 2001 and 2015.

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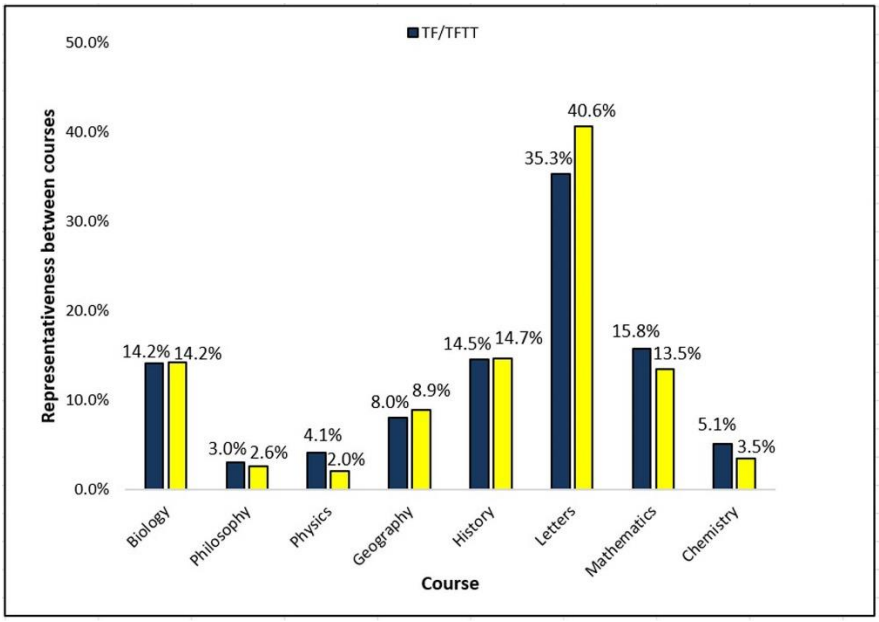
Figure 4 – Representation of each course by the number of freshmen and graduates from 2001 until 2015



Note: ratio between the number of freshmen in each course (presential and distance) by the number of total freshmen in the selected teacher-training courses (TF/TFTT) and the ration between the number of graduates in each course (presential and distance) by the total number of graduates in the selected teacher-training courses (TG/TGTT).

Source: created from Inep (2017).

Some courses in this analyzed period have a higher number of graduates than freshmen. This is due to that fact that the graduates are not necessarily the same who entered in this period. There are, in this case, graduates that entered before 2001 and freshmen who did not graduate until 2015.

Even if the graduates between 2001 and 2015 are not the same freshmen of the same period, it is possible to compare these two data. Most courses present a percentage of freshmen very close to the graduate one, some even higher than the percentage of freshmen. However, in the case of Physics and Chemistry those are clearly different. From the freshmen of the selected teacher-training courses, 5.1% started the course in Chemistry, but the number of graduates corresponds to only 3.5%. Physics has an even higher variation: 4.1% of freshmen and 2% of graduates. Thus, we can see that the drop-out levels in Physics courses are higher than all the other analyzed courses, directly reflecting on the considerable deficit of teachers graduated in the area to work in K12 education.

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This reality can be explained by different reason which need to be investigated by more specific and deeper studies for each context. However, from the researches already done about the theme in Brazil (Alvarenga et al., 2012; Caôn e Frizzo, 2010; Costa & Dias, 2015; Gatti & Barreto, 2009; Louzano et al., 2010; Rosa, 2014), we can infer that some of these reasons lie in the fragility of K12 education that, also for different reasons, does not offer a solid base which would guarantee students' permanence in the undergraduate courses.

As beforementioned, governmental actions such as Reuni, Fies, and Law nº 12.711/2012, contributed to a greater democratization on the access to Higher Education, as young people, especially those from low-income families, and most of them from public schools, had better opportunities to compete for places in the universities with students from higher social classes, who mostly studied in private schools and had access to an education that, according to Alvarenga et al. (2012), prepared them to be admitted in good public universities.

A study done by Louzano et al. (2010) indicates that Brazil has attracted individuals with low academic performance and low socioeconomic level for the teacher-training courses. This data is corroborated by the *Síntese de Indicadores Sociais* (SIS) of *Instituto Brasileiro de Geografia e Estatística*s (IBGE) of 2014, according to which low-income students represented in 2004, 1.7% and 1.3% of the enrolments in Higher Education in the public and private system, respectively. In 2013, these numbers grew to 7.2% and 3.7% (IBGE, 2014), showing an increase in the access of low-income young people in undergraduate courses.

However, to increase the access to education is not the same as guaranteeing the conditions of permanence and equity for Higher education freshmen (Caôn & Frizzo, 2010). On the contrary, to increase access opportunities, but not to offer conditions of permanence can, in fact, reinforce the historical and social inequalities of Higher Education. The drop-out in this educational level and, more specifically, in teacher-training courses can also be a result of the barriers found by many students that, for not having a study routine established or time to dedicate to academic activities (be it for subjective or objective conditions), face difficulties to continue their academic life (Costa & Dias, 2015). According to Rosa (2014), students, especially those from public school, when starting their Higher Education trajectories can face some barriers due to their insufficient basic formation.

This insufficiency is evident when we analyze the data of national indicators, such as *Avaliação Nacional do Rendimento Escolar* (National Assessment of School Performance),

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commonly known as *Prova Brasil*, one of the assessments thar are part of the *Sistema Nacional de Avaliação da Educação* Básica (Saeb- National Assessment System of Basic Education). *Prova Brasil* is a test done with students in the 5th and 9th grade of Elementary Education and in the last year of High School encompassing all public schools with at least 20 students enrolled in the assessed grades. It is a biannual census test that evaluates students' abilities and performances in Portuguese – focus on reading- and Mathematics – focus on problem-solving. It is an evaluation developed by Inep that aims to diagnose K12 education and assess the quality of education offered in Brazilian educational system (Inep, 2014).

The results of Saeb 2015 show that the national average of students in Mathematics, for example, is 219.3 (level 4- basic) when the target would be 225 in the 5th grade[4] (Inep, 2016b). This average shows that these students leave the first years of Elementary education without knowing how to: recognize the cube planification among other forms presented, to convert more than a full hour into minutes, to determine the result of a multiplication of a full number by a number represented by a decimal, and to solve problems in the national financial system, involving addition and subtraction of bills and coins, contents that are part of the level 5 (over 225) in which students would be considered proficient in Mathematics in this phase of the Elementary level (Inep, 2014).

For 9th grade students, the results are a bit worse. With 255.8 points, these students were, in 2015, on level 3, also presenting a low level of Mathematica learning (Inep, 2016b). According to national scales of proficiency, this average indicates that students end the last year of Elementary Education without mastering important contents to continue their studies, such as: to locate a point in a cartesian plan from its coordinates, to convert measures of length, from meters to centimeters, to determine the numeric value of a first degree equation, and to locate full negative numbers in a numeric line- contents that are part of level 4, over 275 points (Inep, 2014). When finishing Elementary Education with those learning gaps in Mathematics, many students will continue to have problems in the subject during High School

[4] To help interpret the data of *Prova Brasil*, Inep released in 2014 a *Nota explicative* (Explanatory note) of the 2013 results. The grade presents the normative ordinances, the methodology used, the process of assessment, and an explanation on the analysis and interpretation of the results. For this analysis, the document presents proficiency scales with the levels students reached – according to the scores in the exam – and the explored contents for each level. For example, according to the proficiency scale in Mathematics, 5th grade, the student who scored between 125 and 150 points would be in level 1, thus, capable of "determining the area of figures drawn into square paper through counting" (Inep, 2014, p. 18). From this document, we can analyze the results obtained in *Prova Brasil* in the year 2015 for the 5th and 9th grade of Elementary Education and the senior year of High School.

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Prova Brasil 2015 was also done by the High School seniors, who had a national average of 267 points in Mathematics versus the expected 350 points to reach proficiency in the subject (Inep, 2016b). This average represents a level 5, according to which students are able, among other aspects, to solve equations and calculate the division of profits regarding two initially different investments (Inep, 2014).

The general results released by Inep on the *Exame Nacional do Ensino Médio* (Enem-National High School Assessment) of 2016 also show that the area of Mathematics and its technologies have the second lowest performance average (489.5 points over a total of 1.000). Most students who did the test reached grades between 400 and 500 points (2,430,115 participants). Out of the participants, 5,734 had zero, a considerably higher number than those over the average (3,747 participants who reached grades higher than 900 points) (Inep, 2016a).

Another concerning aspect are the Chemistry, Physics, and Biology, which make up the area of 'Natural Sciences and their technologies'. This area had an average of 477.1 points, the worse general average in Enem 2016. Though the number of students with zero (3,109) is lower than 'Mathematics and its technologies', the number of students above the average is much lower (632 participants with grades between 800 and 900), and no participant has reached a grade higher than 900 points. The vast majority (3,234,551 participants) did not score more than 500 points (Inep, 2016a).

These numbers, by themselves, are not very representative and do not reflect all the knowledge acquired by students – or by most of them- during K12 education, what would demand a more rigorous and deeper analysis on the data. However, they indicate that most students are concluding K12 education without the minimum adequate knowledge in important areas. But, why do we present these data on K12 students' performance when discussing the drop-out on teacher-training courses?

According to Louzano et al. (2010), educational research has consistently shown that most part of the variation on students' performance is due to the knowledge acquired before Higher Education, as well as family and community characteristics. When analyzing the data of Enem 2005, these authors have seen that around a third of students interested in the teaching career are among those with the worse performance in different High School subjects. The same can be seen on studies done by Vaillant (2006) and Gatti & Barreto (2009), which show that a great number of students who choose teacher-training courses come from low-income classes

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and with a low cultural capital, studied in public schools, has a low performance is assessments, works and, often, is the first generation of the family to enter Higher Education. Without mastering the necessary content to continue their studies, when they are admitted to an undergraduate course, many of them face difficulties in different subjects.

These difficulties, together to other aspects, can lead to students' disappointments with the course, the university, and even with themselves, which can contribute for them to drop-out. An example can be occurring in the teacher-training on Physics that, as shown in this work, has the highest drop-out rate compared to other teacher-training courses. Thus, though we cannot infer on the real performance of teacher-training students in Higher Education only through the numbers of Saeb and Enem, these data shed a light on the profile of most individuals attracted by the teaching career in Brazil and the association of this profile and the academic performance in teacher-training courses.

Moreover, as we are specifically dealing in this work with teacher-training courses, we can point another possible cause equally detrimental to the low demand and the high drop-out in these courses: the lack of a broad, global, and systematic policy to develop teaching career.

The Resolution nº 2, July 1st, 2015, which define the National Curricular Guidelines to pre-service and in-service teacher training, presents, based on some studies developed by Inep on the profile of High School teachers published in 2015, some indicators on teacher training in Brazil. According to those studies, out of the total of Physics teachers in regular High Schools (50,543), 27.1% teach only Physics and 72.9% teach Physics and another subject, especially Mathematics. The data also show that, out of the teachers who only teach Physics and work exclusively in High School, 49.6% do not have a specific training in the area. When considering those who teach Physics and other subjects in the same educational level, this percentage reaches 84.8% of the total ("Parecer CNE/CP", 2015).

However, as analyzed in this article, the lack of Physics teachers – and in all other subjects- in Brazil is not necessarily related to the lack of places offered in teacher-training courses, but to the reduced number of occupation and graduates in those courses, especially in the teacher-training course of Physics. This discrepancy among the number of places, the number of graduates, and the occupation rate can reflect another, even bigger and more chronic, problem: the lack of a broad, global, and systematic policy of teacher training in Brazil which contemplate not only opportunities of access to teacher-training courses, but, above all,

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objective and subjective conditions of training, work, and career, that are more adequate and attractive to this public and to the teachers that are already working in the public and private sectors.

As previously discussed, the lack of teachers in Brazil is a conjectural and chronic problem, historically produced by the de-responsibility of the State to maintain a public, free, and good education. According to Freitas (2007), the pedagogical work conditions in school – especially in public ones- demand a high public investment in policies that improve the practice. According to the author, it does not seem coherent to draw a training with demand levels that correspond to the importance of the teachers' role without considering, for example, the need to associate them to adequate and satisfactory work conditions and an attractive career that stimulates personal and professional development.

As shown by the data analyzed in this work, the number of students who currently opt for teacher-training courses in Higher Education institutions shows the potential of those people towards teaching (Freitas, 2007). However, most actions proposed by the State to develop pre- and in-service training of K12 teachers do not seem to be contributing to overcome the realities experienced in public schools, but simply to mask it (Deimling, 2014). We think that the lack of broader, conjectural, and concrete actions and measures can demotivate students' choice for and their permanence in teacher-training courses and the option for a teaching career.

Final remarks

The result of the indicators in teacher-training courses in Brazil, as it is discussed in this work, show important analytical elements on teacher training and perspectives for the field because it problematizes relevant data on the occupation of teacher-training courses in public Higher Education institutions in Brazil, and allow us to consider possible reasons to justify this scenario. This study, together with others on the theme, can establish an important database to discuss and draw national policies that, established on an organic, systematic, and articulated coordination, can, not only set their directions, but also offer conditions for students to enter, continue, and graduate in teacher-training courses in Brazil, as well as enter and continue in the profession.

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From these results, we can see that, among the analyzed courses, the training in Physics has the most critical state considering the number of graduate teachers. Among the factors that may be influencing this reduced number of Physics teachers, we can highlight: (i) high level of drop-out, (ii) low number of places offered compared to other teacher-training courses, and (iii) low demand for teacher-training courses, considering, among other reasons, the lack of attraction for the teacher career.

Certainly, the number of places offered is a relevant factor in the training of new teachers, as, with more places, those courses would be more geographically accessible to students- with more universities offering teacher-training courses, more people could have the opportunity to study and to graduate. However, the increased access to High Education, by itself, does not favor the training of new teachers. We think that the problem of drop-out in teacher-training courses involve various aspects and conditions and, as such, cannot be solved through emergency, isolated, and palliative measures.

Together with access- essential to a better democratization of education- it is necessary to have a teaching national policy that includes more funding by the governments to improve the conditions of permanence and learning of students in Higher Education institutions, involving financial aspects and their previous knowledge base. Similarly, it is necessary to invest in better objective and subjective work conditions and in the teachers' career, to promote, beyond a good training, minimal work conditions, human and material support for them to work in schools, as well as a better social value. With this global and broad policy, issues related to the low use of places and the high evasion of teacher-training courses- especially Physics- could also be solved and overcome.

However, contrary to a policy that values teaching, the Law nº 13.415, proposed by the federal government, was approved in 2017 to reformulate High School. Among the proposals which altered the Law of Guidelines and Bases of National Education (Law nº 9.394/1996), they included the "*Notório Saber*" as a professional of Education. That is, the inclusion of a professional with no pedagogical training (without a teacher-training diploma) who could work in K12 education. This can bring great losses to a national policy of teacher-training, for the teaching career, their work conditions, and student training, considering the lack of value given to teacher-training courses.

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The *notório saber* represents the withdrawal of the State from its responsibilities towards teacher-training public policies and the value of teacher career. This measure, aiming to palliatively solve the deficit of teachers, reiterates the responsibility of the State to propose effective measure to value and increase the attractiveness of the profession. This denies the real problems of education and emphasizes the neglect with teacher training for K12 education, hindering the quality of the education offered, especially in public schools.

Certainly, the quality of education and teachers' value do not solely depend on teacher training. Other elements are equally important, such as social and financial value given to the profession, the objective work conditions, the ways to organize teachers' work and school management, public policies of education and funding, among others. All these factors should be part of a broad, organic, and global policy, and have to be considered when drawing a national policy of teacher training.

We recognize the limitations of this study, which have as a starting point only the statistical data released by Inep, which allow us, based on other studies on the theme, to draw some discussions and ideas on the reduced use of places in teacher-training courses in Brazil. Thus, this work does not end the debate and the reflection on the low occupation of places and high drop-out rates of teacher-training courses, as the real drop-out problem on these courses can be associated not only to one or another barrier during their academic trajectory- internal or external to the courses and institutions- but to the lack of policies that effectively guarantee the permanence of students in teacher-training course and in the career after graduation. All variables involved in this process cannot be analyzed in isolation, but as a whole, so as to enrich and broaden the investigations that have been done on the theme and contribute to create a scenario on the history, the diagnosis, and the challenges of teacher-training in Brazil.

Because of this, we think it is necessary the development of other studies that aim to deeper analyze each case, to diagnose the factors that kindle the low occupation rate and dropout in each specific context, as well as to propose ways to overcome this reality and the chronic problem of lack of teachers in the country. Therefore, it is important to development research that can investigate, also based on ideas, perceptions, and concepts of the subjects involved in the process, other realities and conditions that have been leading to the high drop-out rates in Higher Education, considering the creation of action proposals that can contribute to solve this problem.

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Despite the limitations of the study, we consider that it brings relevant data, analyses, and discussions to the already existing researches on teacher training. An article such as this, together with others discussing education in general and teacher training in particular, can provide consistent elements to understand the complex scenario of teacher training and work and, thus, to establish policies to create the necessary improvements.

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Submitted for evaluation in December 20th, 2017; revised in July 18h 2018; accepted for publication in March 16th, 2019.