Revista Brasileira de Gestão e Desenvolvimento Regional
G&DR. V. 16, N. 3, P. 494-506, set-dez/2020. Taubaté, SP, Brasil.
ISSN: 1809-239X

Received: 03/08/2017
Accepted: 08/27/2018

INTERIORIZATION OF FEDERAL INSTITUTES AND UNIVERSITIES: AN ANALYSIS OF THE STUDENTS' PROFILES AND ITS POSSIBLE EFFECTS

INTERIORIZAÇÃO DOS INSTITUTOS E UNIVERSIDADES FEDERAIS: UMA ANÁLISE DO PERFIL DOS ALUNOS E SEUS POSSÍVEIS EFEITOS

Paulo Henrique Farias Barbosa[1]
Luis Henrique Romani Campos[2]

Abstract

This paper analyzes the typology of the regional division of the areas of higher education where the students of the interior campuses opened as of 2003 of Federal Institutes (FIs) and Federal Universities (FUs) are inserted. Furthermore, it analyzes the profile of these students in each area of education based on Regions. For that, descriptive statistics and multiple correspondence analysis (MCA) are used. Thus, it was verified that the students of these new campuses (both FIs, as well as FUs) in the North, Northeast and Midwest Regions, are, mostly, enrolled in teacher training courses. On the other hand, students from the South and Southeast Regions are concentrated in areas directly related to the production of goods and services. Moreover, students of teacher training courses need greater support of public policies promoting the access to and permanence in higher education; this is because students from public schools and students who are quota students, Black, and Mulatto are concentrated in this area. Engineering and Production students, on the other hand, seem to be those who need these policies the least, as they come from private schools, are not quota students, do not receive social support, and are Caucasian and Asian.

Keywords: Multiple Correspondence Analisys (MCA). Higher Education. Public Policies. Regional Development.

Resumo

O presente trabalho estabelece uma tipologia da divisão regional das áreas do ensino que os estudantes dos *campi* do interior abertos após 2003 de Institutos Federais (IFs) e Universidades Federais (UFs) estão inseridos. Além disso, analisa o perfil desses alunos em cada área do ensino, fazendo um corte regional. Para tanto, utiliza-se estatísticas descritivas e o *multiple correspondence analisys (MCA)*. Com isso, constatou-se que os alunos desses novos *campi* (tanto dos IFs, quanto das UFs) nas Regiões Norte, Nordeste e Centro-Oeste, são, em sua maioria, de cursos voltados para a licenciatura. Por outro lado, os estudantes do Sul e Sudeste estão concentrados em áreas do

[1] Master in Applied Econometrics and Forecasting from the University of Lisbon - ISEG and Research Analyst at the Agency for Investment and Foreign Trade of Portugal - AICEP, Lisbon, Portugal. Email: paulofbarbosa5@gmail.com
[2] Doctor in Economics (UFPE). Full researcher at the Joaquim Nabuco Foundation, Recife - PE, Brazil. E-mail: luis.campos@fundaj.gov.br

conhecimento diretamente ligadas à produção de bens e serviços. Além disso, os alunos da área da educação necessitam de maior apoio das políticas públicas voltadas para o acesso e permanência no ensino superior; visto que essa área concentra os estudantes provenientes de escola pública, cotistas, que recebem apoio social, cor preta e parda. Já os alunos das áreas da engenharia/produção, parecem ser os com menos necessidade dessas políticas, dado que são provenientes de escola particular, não são cotistas, não recebem apoio social, são de cor branca e amarela.

Palavras-chave: *Multiple Correspondence Analisys (MCA)*. Ensino superior. Políticas públicas. Desenvolvimento regional.

Introduction

At the beginning of the 21st century, more precisely as of 2003, a restructuring of public higher education occurred in Brazil. In other words, the federal government implemented public policies related to the access and permanence of students of the Federal Universities and Federal Institutes, in addition to favoring the physical expansion of such universities into the country's interior. The result of this interiorization, as shown by Firmino and Campos (2014), was the creation of 126 new Federal University campuses from 2003 to 2010, in addition to 422 new Federal Institute campuses since 2003.

The major catalysts for the expansion of federal higher education into the country's interior were the Support Program for Plans of Restructuring and Expansion of the Federal Universities (REUNI, 2007-2012) and Law No. 11,892 (of December 2008). With Law No. 11,892, 140 education institutions that, in their majority, aimed at offering high-school level technical vocational education (such as federal technical and agro-technical schools) have become Institutes of Education, Science, and Technology (BRAZIL, 2016). Based on that, they started to develop a new concept of vocational education, offering higher education courses related to technological fields (PACHECO, 2011).

Melo, et al. (2014) show that most students of these new campuses created in the country's interior would hardly have access to higher education without the policies of expansion of the Federal Universities. According to these authors, most of those students are overcoming their family's level of education, which enables an upward social mobility and the formation of a new *habitus*. Additionally, Firmino and Campos (2014) highlight that the students of the new interior campuses are the genesis of university experience in their families.

This progress of higher education into the country's interior aims at democratizing the access to higher education – given that this type of education is concentrated in major urban centers. And these campuses are located where there is a large contingent of students who are not able to migrate into the large urban conglomerates. Additionally, such campuses may promote a wider spatial income distribution, given that formal education increases occupational productivity, which may increase the wage levels of the students in the country's interior.

In this same context, the Federal Institutes play an important role in the democratization of the access to public higher education - as, in 2014, 64.5% of the students of the Federal Institutes were from campuses located in the country's interior, according to data of the Summary Statistics of Higher Education (National Institute for Education Studies and Research – INEP, 2014). That may be attributable to Law No. 11,892, which converted federal technical and agro-technical schools (located mostly in the interior) into Federal Institutes; in addition to the public's desire to bring federal higher education into locations that still had not offered this type of education.

Thus, these policies may mitigate social inequality among regions by promoting the objectives of "creating conditions for federal universities to promote the physical, academic, and pedagogical expansion of federal higher education" (BRAZIL, 2012). As for the Federal Institutes, according to Brazil (2008, p. 5), they are based on social justice, equity, economic competitiveness, and generation of new technologies; as well as the commitment to being capable of responding quickly and effectively to the demands on vocational training, dissemination of technological and scientific knowledge, and support for local business clusters.

However, the analysis of the profile of the students of the new campuses of the Federal Universities opened in the country's interior, according to Barbosa, Campos, and Firmino (2015), shows heterogeneity between regions, regarding the policies related to the access and permanence of the students (only 1.14% of the students of the North Region receive social support, while 24.77% of the students in the South Region receive the same benefit). Additionally, they count on a low level

of policies related to access and permanence, considering the objective of social inclusion represented by these campuses.

Moreover, the analysis carried out by Barbosa, Campos, and Firmino (2015) shows a regional division in the fields of the courses offered through the policies of expansion and interiorization of the Federal Universities. Thus, in the North, Northeast, and Midwest Regions, the courses opened are mostly teacher training courses. While in the Southeast Region there is a concentration of courses related to Sciences and Technologies, and in the South Region the courses are mostly related to Engineering. In other words, in the wealthier regions of the country, the courses are mostly production-related, and in the less productive Regions, the courses are focused on teacher training.

This confirmation creates the need for a more detailed research on how the offer of higher education by the federal government may change the dynamics of the Brazilian regional concentration of production. In other words, if the students of the higher education courses that are more related to the direct application in the productive sector are concentrated in the wealthier regions of the country (South and Southeast), the expansion of higher education may underpin the century-old trend towards spatial concentration of wealth in the country. Nevertheless, the data is not sufficient for more accurate statements, as it does not comprise the entire offer of higher education by the federal government, as it does not include students from the Federal Institutes – which probably offer the more specialized courses in labor supply for companies and industries.

Hence, this paper indents to answer the following question: "to what extent do students of the Federal Universities and of the Federal Institutes have complementary profiles and, if they are complementary, to what extent does this profile reflect the local reality or can it affect this reality in the long run? This paper is divided into another three sections, in addition to this introduction. The following topic introduces the objectives, then the theoretical framework, the methodology, followed by the results, and, finally, the final remarks.

Theoretical Framework

History of the Brazilian Higher Education:

The historical context of the higher education in Brazil is marked by the strong stratification and absence of public policies related to the access and permanence of low-income students. This type of education in Brazil started with the arrival of the Portuguese Royal Family in 1808, in addition to being supported by the private sector (SAMPAIO, 1991).

Accordingly, although the higher education in Brazil was just started with the arrival of the Royal Family, it just acquired a university character over one century later. In other words, the first Brazilian University[3] (University of São Paulo – USP) was only created in 1930 (SCHWARTZMAN (2006); DURHAM (2005)), introducing a new and striking feature, to date, in the higher education, with a perspective related to education, research, and extension courses. Soon after the creation of the first university, the Brazilian University Statute was enacted in 1931, establishing the ground for the creation of other universities (UNZÉ, 2012).

Subsequently, the decade before the 21st century architects a scenario of changes in higher education, with the creation of public and private institutions, especially with the Brazilian Federal Constitution of 1988 that outlines powerful transformations in the Brazilian education, in addition to reinforcing other trends (in article 207, for example, it defines university autonomy and the indissoluble practice of education, research, and extension courses). Nonetheless, the early '90s was a time of strong tax adjustments in the Brazilian economy, with the public university suffering budget cuts that resulted in the precariousness of the teaching career and the campuses infrastructure of the federal universities (UNZÉ, 2012). This change in the Brazilian higher education landscape enabled an accelerated higher education expansion process in the country – especially by the private sector (FIRMINO, 2014; DURHAM, 2005).

Starting in 2003, a strong expansion of the public higher education took place in Brazil, with predominance of the "university" model among the potential options of academic categories (MELO and CAMPOS, 2014). Thus, these new campuses had an important role in the democratization of the access to federal higher education in the country's interior, in addition to spread knowledge through scientific researches, which boost the technological progress and the socio-economic and regional

[3]In 1920, the first Universities in Brazil are created by uniting higher education schools isolated in the state of Paraná and Rio de Janeiro, through the formal union of traditional school that already existed (SAMPAIO, 1991).

development. This expansion of Federal Universities resulted in an increment of approximately 60% in the number of students up to 2011 (BRAZIL, 2012).

History of the Brazilian Technical Education

The Brazilian technical education also took its first steps during the Empire with the creation of the "Schools of Arts and Crafts", aiming at offering beggars and people from the lower classes a craft with basic instructions to obtain a profession (MANFREDI, 2012). Since then, the purpose was to offer the most unhealthy and manual works to the lower classes, leaving the elite with the purely intellectual work, as stated by Taufick (2013).

Nevertheless, it was only with President Nilo Peçanha's Decree No. 7,566 in 1909 that the vocational education was regulated, creating 19 "Schools for Apprentices and Craftsmen" (BRAZIL, 2008). Only the Federal District and the state of Rio Grande do Sul were not benefited from the creation of these schools, as the choice for the states was based on politics, since they were all built in capitals, even those which did not have manufacturing activity (MANFREDI, 2012). These schools offered manual and mechanical works and literacy courses (TAUFICK, 2013).

With the change in the economy in the '30s, the Ministry of Education was created in this same decade, and the Schools for Apprentices and Craftsmen, which were first linked to the Ministry of Agriculture, were integrated to the Vocational Education Superintendent's Office in the new Ministry of Education and renamed Industrial Schools (BRAZIL, 2008). It was from that moment that these schools started to offer all education levels still in the '30s (OTRANTO, 2010).

With Decree No. 4,127 of February 1942, the Industrial and Vocational Schools replaced the Industrial Schools, in which the students could enter directly in the higher education, since the technical education in these institutions was equaled to the secondary education (OTRANTO, 2010). Nevertheless, it was when these institutions became independent agencies and were referred to as Federal Vocational Schools in 1959 that the education of technicians was intensified to meet the growing demand for labor in the industrialization process at the late '50 (TAUFICK, 2013).

The Federal Centers of Vocational and Technical Education (CEFETs) were created in 1978 through the transformation of three Federal Vocational Schools (in Rio de Janeiro, Paraná, and Minas Gerais) into CEFETs, aiming at the education of engineers and technicians (OTRANTO, 2010). Thus, the federal vocational education network was being shaped throughout the years.

With Law 11,892 (of December 2008), 31 CEFETs, 75 decentralized teaching units (Uneds), 39 agro-technical schools, 7 federal vocational schools, and 8 schools linked to universities were closed and became Federal Institutes of Education, Science, and Technology (BRAZIL, 2016). The creation of Federal Institutes changed the Brazilian technical education landscape. They were formerly marked by institutions that only offered vocational courses at the level of high schools – Federal Agro-technical Schools (EAFs) and Federal Vocational Schools (EFTs), for example. After the creation of Federal Institutions, it was established that these schools would start to provide higher education courses related to technical fields.

Until 2002, there were 140 federal vocational school units and, in 2015, this number increased to 562 units. Additionally, in 2002, there were 26,262 students in these federal vocational school units, and 9,452 (36%) were located in the country's interior. By 2014, there were 123,288 students in the federal vocational units, where 79,482 (64.5%) studied in the countryside (Summary Statistics of Higher Education – INEP, 2002 and 2014). Thus, in addition to the strong expansion of the federal vocational education, another characteristic of the Federal Technical Education Network is the interiorization.

Therefore, this expansion of the vocational education can generate new technologies, greater vocational training, dissemination of scientific and technological knowledge, greater support to local productive arrangements, and reduction in territorial income inequality.

Methodological Procedures

Considering that the purpose of this paper demands establishing the profile of students of Federal Universities and Federal Institutes and that the database to be consulted has its origins in a large set of administrative records, the best way is to employ multivariate analysis techniques that enable information to be abridged before the classifications and/or comparisons are made. This section presents the path of the multivariate analysis chosen and the treatment given to the administrative records.

Multiple Correspondence Analysis (MCA):

Given that the variables of the Higher Education Census are discrete (gender, color/race, if receives scholarship – for example) it is not possible to use factor analysis or principal component analysis to reduce the dimension of data and make its interpretation easier. Thus, Abdi and Valentim (2007) and Escofier and Pagès (1992) suggest to use, in a case like this, the multiple correspondence analysis (MCA), which is a generalization of the principal component analysis. These authors recommend transforming quantitative data into classes when a database has metric and non-metric variables. Therefore, Escofier and Pagès (1992) show that the MCA may be used both for reducing the dimension of data, thus, making the analysis easier, and for typifying the population (in this paper – the students).

With the MCA, the database is transformed into categories that vary among themselves, i.e., for each observable quality of a variable, a categorical variable is created (assuming values 0 or 1). Escofier and Pagès (1992) define the distance between two individuals using the equation below, where I represents the individual, J, the variable, and k, the quality of the categorical variable:

$$d^2(i,\ell) = \Sigma_k \frac{IJ}{I_k}\left(\frac{x_{ik}}{J} - \frac{x_{lk}}{J}\right)^2 = \frac{1}{J}\sum \frac{I}{I_k}(x_{ik} - x_{\ell k})^2 \quad (1)$$

This statistical technique estimates the parameters in the same way as the principal component analysis, i.e., it finds components in order to maximize the explanation of the data variability, establishing that they are orthogonal. The analysis of results of the MCA goes through the load of the components and the inertia (including the eigenvalues). The load of the components shows how much the variable is related to the component, and is the base for understanding its meaning. Inertia, on its turn, shows how much of the data variance is being explained by the corresponding component (ESCOFIER AND PAGÈS, 1992).

Database:

In order to identify the new campuses opened in the interior, the "Analysis on the Expansion of Federal Universities 2003 to 2012", the Higher Education Census 2014, and REUNI's Map of Expansion of Federal Universities were used as basis. The "Analysis on the Expansion of Federal Universities 2003 to 2012" was prepared by a commission, established by the Ministry of Education, composed of two representatives of the National Association of Directors of Federal Higher Education Institutions – Andifes, two representatives of the National Union of Students – UNE, two representatives of the National Association of Graduate Students – ANPG, and two representatives of the Office of Higher Education of the Ministry of Education – Sesu. The purpose of this commission was to outline the various forms of expansion of Federal Universities and to report some of the results obtained (BRAZIL, 2014).

The Higher Education Census includes information on higher education institutions (courses, places, applications, enrollments, newly admitted students, graduating students), as well as information on students and professors. These data are collected by asking Federal Higher Education Institutions (IFES) to complete questionnaires and importing data from e-MEC[4] (INEP, 2016).

The REUNI program provides the Map of Expansion of Federal Universities and Institutions. This report brings information with respect to the location of the campuses – by state and city – and the period of creation of all campuses of the IFES (data available at the Ministry of Education's electronic gateway).

The analysis on the expansion of the Federal Universities lists 321 campuses that have received funds from REUNI. Based on this list, searches for the date of opening of each of these institutions were carried out in the websites of the IFES. As the period under analysis begins in 2003, the criterion adopted was to keep in the sample only those where the IFES did not offer any higher education courses outside this period. In other words, advanced units that had a few courses but that gained campus status after 2003 were not included in this analysis. This criterion was adopted because studying the impact of the opening of a campus is different from measuring its expansion.

[4] Electronic monitoring system of higher education institutions.

On the other hand, the campuses of the Federal Institutes that started to offer higher education after 2008 were included in the sample. Therefore, a list of 312 campuses of IFES opened after 2003 were obtained.

In order to select only the students of the campuses created after 2003, the municipal code of the Brazilian Institute of Geography and Statistics – IBGE was used, for this reason the Federal District (DF) was excluded from the analysis, as IBGE does not codify satellite cities (all cities have the same code as Brasília), which implies that it is impossible to distinguish students of new campuses in INEP's base.

Chart 1 contains the variables (and their descriptions) of INEP's base that were addressed in this article.

Chart 1: Variables used in the analysis

Variable	Description
CO_COR_RACA_ALUNO	Student color/race.
IN_SEXO_ALUNO	Informs the student's sex.
CO_TIPO_ESCOLA_ENS_MEDIO	Type of school in which the student graduated from High School
IN_ALUNO_DEF_TGD_SUPER	Informs if the student is a person with disabilities, has global developmental disorder, has or high skills/giftedness.
IN_ATIVIDADE_EXTRACURRICULAR	Informs if the student is involved in any type of extracurricular activity (non-mandatory internship, continuing education course, tutoring, and research)
IN_RESERVA_VAGAS	Informs if the student was enrolled in the course through the quota system.
IN_APOIO_SOCIAL	Informs if the student receives any type of social support.
IN_ING_VESTIBULAR	Informs if the student was enrolled in the course through the college entrance exam.
IN_ING_ENEM	Informs if the student was enrolled in the course through the High School National Exam (ENEM).
CO_OCDE_AREA_GERAL	Course identification code based on an adaptation of the Eurostat/UNESCO/OECD international classification methodology

Source: Microdata provided by the Higher Education Census 2010 (INEP)

The first step taken was to analyze the descriptive statistics of the variables and explore basic crossings. After these basic crossings, it was decided to adopt multivariate analysis techniques in order to propose a reduction in dimensions and simplify the analysis vectors.

Results and Discussion

In this section, we present the results of the research through descriptive statistics and through the MCA – as described in the methodology. This paper does not describe income-related issues or those related to the social level of the students' families, as the database is mostly administrative and does not provide such information. However, the variables presented here enable the regional exploration of the process of expansion of the offer of public higher education made by the federal government as of 2003.

Table 1 brings the crossing of the volume of enrollments in the great fields of knowledge[5] with the regions where the new campuses are located. It is important to note that table 1 shows the number of students in the campuses of the sample selected in 2014 and may not be interpreted as the offer or the demand of courses. It must be seen as the result of the offer, demand, retention, and evasion. Table 1 may also be a proxy for the analysis of the way each region was benefited quantitatively and qualitatively from the programs of interiorization of higher education made by the central government. In the Midwest Region, for example, there are 1,092 Agriculture and

[5] Listed by INEP based on OECD's international classification.

Veterinary Medicine students in Federal Institutes and 400 in the Federal Universities; and the Midwest Region has a total of 5,011 students in Federal Institutes and 1,490 in Federal Universities.

Based on table 1, the higher education courses offered by the Federal Institutes show higher predominance of the field of Education (37.8% throughout the country), the "Education" field also predominates in the Northeast (47.1%), North (67.5%), Midwest (37%), and South (30.2%) Regions. As for the South and Southeast Regions, they show a low level of students in the field of Education in comparison with the rest of the country, and the Southeast Region has a higher concentration of students enrolled in the fields related to "Engineering, Production, and Construction" (34%).

Table 1: Distribution of students by field of knowledge of the higher education courses, by region of the campus where the student studies, and whether the student is in a Federal University or Federal Institute.

Area Geral	NO_REGIÃO_CURSO											
	Centro-Oeste		Norte		Nordeste		Sudeste		Sul		Brasil	
	IF	UF	IF	UF	IF	UF	IF	UF	IF	UF	IF	UF
Agricultura e veterinária	1.092	400	439	3.290	789	6.789	380	1.400	581	4.517	3.281	16.396
	21,80%	26,80%	8,40%	11,00%	4,20%	11,10%	2,10%	2,60%	7,00%	12,70%	5,90%	9,10%
Ciências sociais, negócios e direito	229	376	525	4.730	1.142	10.076	1.719	7.965	1.579	4.764	5.194	27.911
	4,60%	25,20%	10,10%	15,80%	6,10%	16,50%	9,40%	15,00%	19,00%	13,40%	9,40%	15,40%
Ciências, matemática, computação	1.150	0	238	1.780	1.646	6.954	3.819	16.199	1.236	2.566	8.089	27.499
	22,90%	0,00%	4,60%	5,90%	8,80%	11,40%	20,80%	30,40%	14,90%	7,20%	14,60%	15,20%
Educação	1.853	532	3.526	12.774	8.778	18.708	4.289	6.086	2.510	8.032	20.956	46.132
	37,00%	35,70%	67,50%	42,60%	47,10%	30,70%	23,40%	11,40%	30,20%	22,70%	37,80%	25,50%
Engenharia, produção e construção	598	161	77	3.795	4.061	7.223	6.219	10.350	2.004	11.261	12.959	32.790
	11,90%	10,80%	1,50%	12,70%	21,80%	11,90%	34,00%	19,40%	24,20%	31,80%	23,40%	18,10%
Humanidades e artes	0	0	0	145	311	2.978	435	3.471	91	519	837	7.113
	0,00%	0,00%	0,00%	0,50%	1,70%	4,90%	2,40%	6,50%	1,10%	1,50%	1,50%	3,90%
Saúde e bem estar social	0	0	0	2.871	342	7.446	0	6.200	247	2.827	589	19.344
	0,00%	0,00%	0,00%	9,60%	1,80%	12,20%	0,00%	11,60%	3,00%	8,00%	1,10%	10,70%
Serviços	89	21	415	238	1.573	239	1.023	1.097	50	956	3.150	2.551
	1,80%	1,40%	8,00%	0,80%	8,40%	0,40%	5,60%	2,10%	0,60%	2,70%	5,70%	1,40%
Total	**5.011**	**1.490**	**5.220**	**29.979**	**18.642**	**60.902**	**18.318**	**53.234**	**8.298**	**35.442**	**55.489**	**181.047**

Source: Own preparation based on data of the 2014 higher education census.

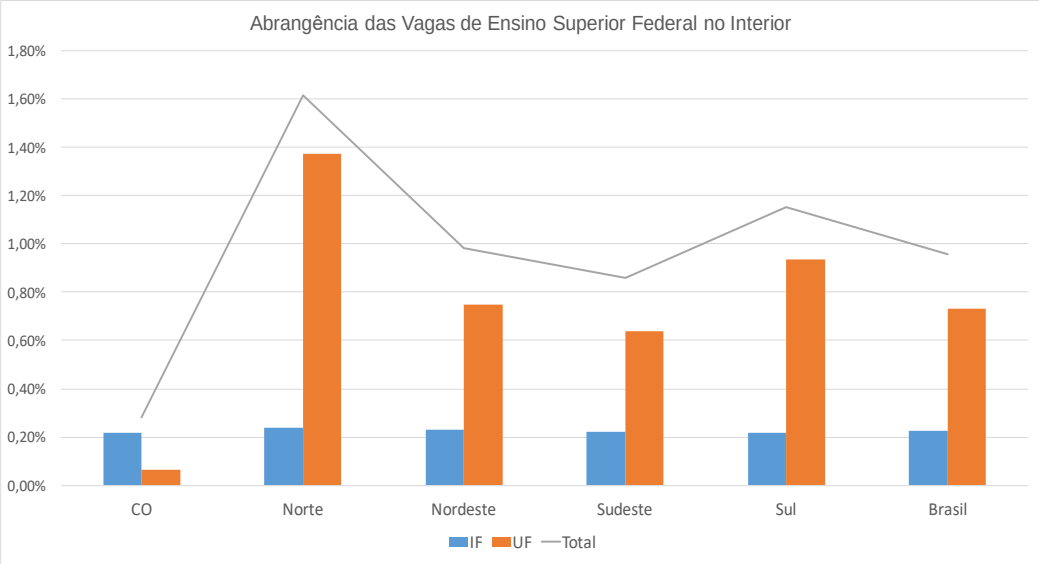
With respect to the Federal Universities, the fields of the students enrolled are regionally similar to those of the Federal Institutes. In other words, the enrollments throughout the country are also concentrated in the "Education" field (25.5%), and it also predominates in the Northeast (30.7%), North (42.6%), and Midwest (35.7%) Regions. The campuses of the Federal Universities opened as of 2003 in the interior of the South and Southeast Regions are different from the other Regions regarding fields of education. In other words, the South Region has a higher concentration of students in the fields of "Engineering, Production, and Construction" (31.8%), followed by "Education" (22.7%). The Southeast Region, on its turn, counts on a strong participation of students in the fields related to technology and production, and the highest concentration is in "Sciences, Mathematics, and Computer Science" (30.4%), followed by "Engineering, Production, and Construction" (19.4%) in second place, "Social Sciences, Business, and Law" (15%) in third place, "Health and Social Welfare" (11.6%) in fourth place, and, finally, "Education" (11.4%).

Chart 1 shows the total places offered by the Federal Universities and Federal Institutes divided by the total youngsters living in the interior (18-29 years old) by Region of the country.[6] This

[6] Those youngsters are those who do not reside in the Brazilian capital cities.

ratio is a proportion of youngsters in the interior that may have access to federal public higher education. For this reason, it is used as a proxy for the scope of the offer of federal public higher education in the country's interior. It can be noticed that, despite the considerable growth of the offer described in the theoretical framework, the volume of youngsters effectively supported is still insufficient for the goals established in the several action (or strategic) plans of national education to be achieved. This is because the percentage is currently barely 2%, in comparison with a goal in the 30% range.[7]

Chart 1: Ratio of the scope of the offer of federal higher education among the young population.



Source: Own preparation based on data of the 2014 higher education census and the 2010 census.

Chart 1 complements the analysis of table 1, showing that the interiorization occurred quite regionally similarly among the Federal Institutes, but it shows a different regional structure with respect to the offer of places in Federal Universities. The Midwest Region showed the smallest amount of places opened in the interior during the period in Federal Universities, while the North Region counted on the largest amount. In the Northeast Region, the number was slightly larger than in the Southeast Region, but smaller in comparison with the South Region.

The structure of the offer of federal public higher education in the country is, therefore, regionally similar between the Federal Institutes and the Federal Universities, and there is no complementarity among the fields of education. In other words, there is a considerable offer of Education places in the North and Northeast Regions, while in the South and Southeast Regions most students are in the fields related to Production of goods and services – offer by both federal institutions. Hence, even though the expansion of these campuses has occurred more intensely in the Northeast Region than in the Southeast Region, these policies may aggravate the regional disparities of income concentration, as they are apparently failing to meet the medium-/long-term demands of production of the less productive regions.

Additionally, Araújo (2013, p. 65 and 66) addresses the low technological innovation in the Northeast Region (especially in comparison with the wealthier Regions of the country), where 92.9% of the industries counted on a medium/low technological intensity, in 2012. Still according to Araújo's work, there was a 0.63% decline of the high-technology industries in the Northeast Region from 2006 to 2012; in contrast with the rest of the country, where there was an 8.18% growth in the same period.

Table 2 has the list of variables selected with both dimensions created through MCA. And through these weights (loads), the variables take a dimension, and it is possible to observe in which dimension each variable has greater influence. Additionally, the weights of the variables with higher value are highlighted. On the other hand, the variables not highlighted have loads close to zero in both dimensions.

[7] It is clear that this indicator is partial, as it does not include the other fields of offer. But it shows that the Government still has a long way to go to expand the offer.

After reducing the dimension through MCA, some variables have bigger weights in dimension 1 and other variables, in dimension 2. The variables with higher loads in dimension 1 are: enrollment through college entrance exam, enrollment through ENEM, and place reservation. These variables are related with the student's access to higher education and, therefore, dimension 1 is called Access. In dimension 2, the variables with bigger weights are: course field, student's skin color, student's sex, and type of school in which the student graduated from High School. These variables are related to personal characteristics of the student and, therefore, dimension 2 is called background.

Table 2: Distribution of variables reduced in dimension due to the corresponding load in dimensions 1 and 2 – sample selected in 2014.

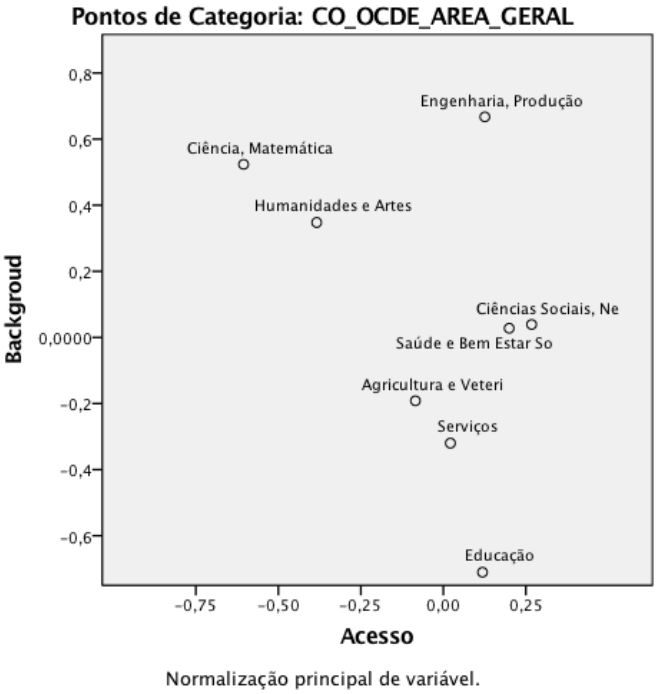
	Dimension	
Variable	1 – Access	2 – Background
Course Field	0.081	0.28
Student's Skin Color	0.045	0.34
Student's Sex	0.007	0.108
Student with Any Disability	0.001	0
Enrollment through College Entrance Exam	0.647	0.045
Enrollment through ENEM	0.682	0.044
Place Reservation (Quota Student)	0.182	0.169
Student Receiving Social Support	0.008	0.06
Student Carrying Out Any Extracurricular Activity	0.002	0.004
Type of School in which the Student graduated from High School	0.169	0.43

Source: own preparation based on the 2014 higher education census.

Figure 2 has the distribution of major areas of education in which the higher education courses are inserted, between both dimensions created. Thus, some areas have some similarities regarding the students' characteristics, while others present some deviation. The students in the "Science/Mathematics" areas and "Humanities/Arts" have quite similar characteristics. So do students in "Social Sciences/Business", "Health and Social Welfare", "Veterinary Medicine/Agriculture", and "Engineering/Production". On the other hand, students enrolled in the areas of "Engineering/Production" and Education have different characteristics than other areas, that is, quite specific profile.

Thus, it is possible to note that the model attributed to the students in the area of "Engineering/Production" a bigger weight in comparison with the student's background. The similarities in students in this area making the background more positive are: students from private schools, with no social support, males, Caucasian and Asian (this is better seen in Figure 3). Additionally, this area is close to the access axis (reason why the value is close to zero), making the analysis through this dimension more difficult.

Figure 2: Vectoral distribution of the major areas of education of students enrolled in the sample selected.



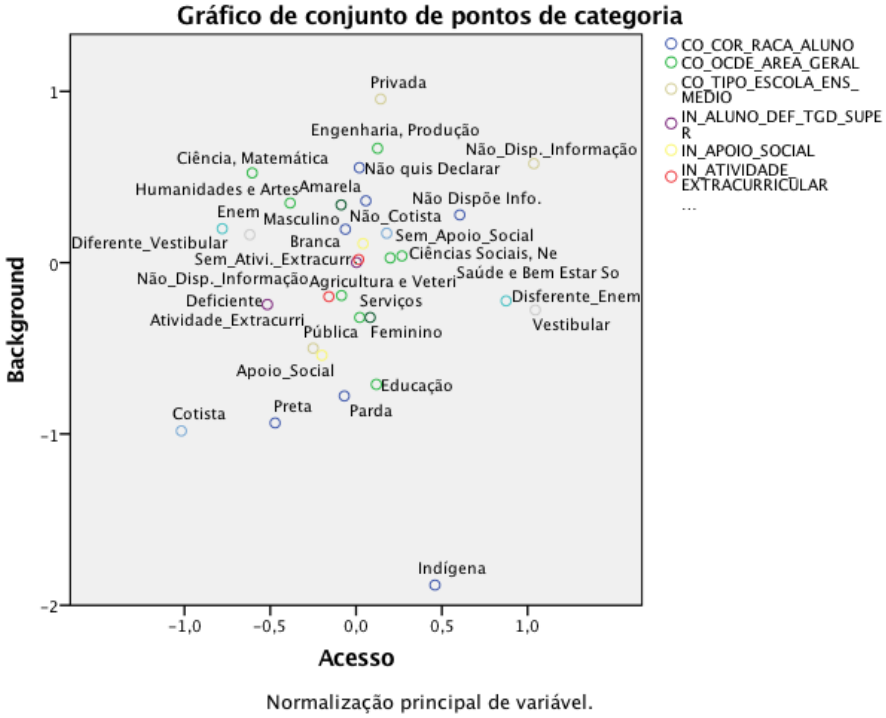
Source: own preparation based on data from the 2014 higher education census.

The areas of "Science/Mathematics" and "Humanities/Arts" are positive for the student's background and negative for access to higher education. They are positive for the background for the same reason as the students in the area of "Engineering/Production" (but in a less intense way). That is, they are, on average, students from private schools, with no social support, males, Caucasian and Asian. However, they are negative for access because the students in those areas are, on average, quota students and were enrolled through ENEM for higher education.

On the other hand, students in the area of "Education" have negative weight on the student's background and are very close to the access axis, making the analysis through this dimension more difficult. Therefore, students in this area have, on average, characteristics quite different from students in "Engineering/Production"; they are students from public school, with social support, female, Black and Mulatto.

Finally, the areas closer to the center in chart 2, "Social Sciences/Business", "Health/Welfare", "Agriculture/Veterinary Medicine", and "Services", are difficult to analyze, since those areas are closer to the crossing of both axes (background and access) and, hence, assuming amounts close to zero.

Figure 3: Vectoral distribution of all variables studied with respect to students enrolled in the sample selected



Source: own preparation based on data from the 2014 higher education census.

Through figure 3, it is possible to understand the dispersion of the elements of figure 2, since the latter comprises all variables of the study. Regarding the background (dimension in which the variables are concentrated –table 2), indigenous students (on average) are different from other students; additionally, they have negative weight on this dimension, keeping them away from the group studying "Engineering/Production" and "Sciences/Mathematics". Another group of students with similar typology (on average) are: quota students, Black and Mulatto, students in fields directed to education, with social support, females, and from public schools. Therefore, in addition to the model detecting similarities between these students, it attributes negative weight to the dimension background – which distances students in courses more related to the production sector (Engineering/Production and Sciences/Mathematics).

In the upper portion of figure 3, with the variables with positive weight on the dimension background, the model shows similarities between some students. This group is mostly composed, of students that: went to High School at a private school; are in courses related to "Engineering/Production" and "Sciences/Mathematics" (and "Humanities and Arts"); are Asian and Caucasian; male; non-quota students and with no social support.

Therefore, according to the model, the latter group seems to belong to a social class with higher income, since it is composed of some variables of the student's background which are mostly in wealthier classes. Additionally, regionally, the courses related to this group (the ones aimed at Engineering/Production and Sciences/Mathematics) are mostly concentrated in the richest axis of the country (South and Southeast Regions). On the other hand, the prior group, with students that graduated from High School in public schools, who are Black and Mulatto, quota students, with social support and in the field of "Education", seems to have an antagonistic profile. Additionally, courses aimed at education are concentrated in the less wealthy Regions – North, Northeast, and Midwest.

Final Remarks

This study mentioned the recent interiorization through federal higher education institutions to establish regional similarities and differences in this process. That is, how this supply of federal public higher education has been made between country regions regarding the areas offered and the profile of students in these new campuses. Additionally, we established a parallel between the areas

of education of IFs and UFs students to analyze whether there is any complement in the education of students in these institutions.

It was evidenced that students in these new campuses are mostly from areas related to teaching degrees, especially in less productive regions of the countries (North and Northeast); and both IF and UF students are concentrated in the education field in these Regions. On the other hand, in the South and Southeast Regions, there is higher participation in areas directly related to the production sector and innovation, such as "Engineering, Production, and Construction" and "Sciences, Mathematics, and Computer Science".

Through the MCA, the dimension of the variables studied was reduced to enable a better analysis of the data and, therefore, certain variables showed higher loads in dimension 1 and others in dimension 2. Dimension 1 is called Access because they showed higher loads in the form of enrollment (ENEM or college entrance exam) and if the student is a quota student. Dimension 2 is called Background because it received higher loads in variables related to the student's profile. Based on that, the areas of education were listed with the dimensions created (through the statistics adopted) to determine the profile of the students in each area.

Thus, the students of some areas of education have quite similar profiles, while other areas include profiles that are different from other areas. For example, the "Engineering/Production" students, on average, come from private schools, were enrolled without quotas, do not count on social support, are male, Caucasian, and Asian. On the other hand, students of the courses related to Education, on average, come from public schools, are quota students, receive social support, are female, Mulatto and Black. This may result in the increase in regional income inequality, as the courses with a higher wage level are composed of a wealthier social class and are concentrated in the wealthiest Regions of the country.

This confirmation shows the importance of public policies for the progress of public higher education into the interior of the country, especially in the Regions with a lower income level. This is because the public that depends the most on public policies to have access to higher education is in the Education field (students coming from public schools, who are quota students, receive social support, and are Mulatto and Black) and this field is concentrated in the less wealthy Regions – North, Northeast, and Midwest. However, it is important that these new campuses in the locations with a lower income level train a labor force that is capable of serving the local companies (and start-ups). Therefore, these new campuses must not only meet the immediate basic education demands, but also the demands on production of goods and services.

References

ABDI, H.; VELENTIN, D. **Multiple Correspondence Analysis.** In N.J. Salkind (Ed.): *Encyclopedia of Measurement and Statistics.* Thousand Oaks (CA): Sage. pp. 651-657.

ARAÚJO, TANIA BACELAR (org.). **Nordeste 2022.** In.: Estudos Prospectivos – Documento Síntese/ Banco do Nordeste do Brasil e Instituto Interamericano de Cooperação para a Agricultura – Fortaleza, 2014.

BARBOSA, P.H.F.; CAMPOS, L.H.R.; FIRMINO, A.L.S. **A expansão das Universidades Federais no interior do Brasil: diferenças regionais e seus efeitos possíveis.** FUNDAJ, 2015.

BRAZIL. Ministry of Education. **Map of Expansion of Federal Universities [*Mapa de Expansão das Universidades federais*]**. Brasília, 2014

_____. **Ministry of Education. Federal Institute – conception and guidelines [*Instituto Federal – concepção e diretrizes*]**. Brasília, 2008.

_____. Ministry of Education. **Report of the Commission Created by Ordinance No. 126/2012**. Analysis on the Expansion of Federal Universities [***Relatório da Comissão Constituída pela Portaria nº 126/2012***. *Análise sobre a Expansão das Universidades Federais 2003 a 2012*]. Brasília, 2012.

_____. Ministry of Education. **Expansion of the Federal Network of Vocational, Scientific, and Technological Education [*Expansão da Rede Federal de Educação Profissional, Científica e***

Tecnológica]. Available at: < http://redefederal.mec.gov.br/expansao-da-rede-federal > Retrieved on: January 19, 2016.

DURHAM, E. Educação superior, pública e privada (1808 – 2000). In: SCHWARTMAN, Simon & BROCK, Colin. **Os desafios da educação no Brasil**. Rio de Janeiro. Nova Fronteira. 2005. p.197-240.

ESCOFIER, B.; PAGÈS, J. **Análisis Factoriales Simples y Múltiples: objetivos, métodos e interpretación.** Bilbao. Universidad del Pais Vasco, 1992.

INEP. **Summary Statistics of Higher Education - 2002 and 2014 [*Sinopses Estatísticas da Educação Superior - 2002 e 2014*]**. Available at: < http://portal.inep.gov.br/superior-censosuperior-sinopse > Retrieved on: February 3, 2016.

FIRMINO, Andresa L. d. S. **A interiorização das Universidades Federais e os Arranjos Produtivos Locais:** o caso da Unidade Acadêmica de Garanhuns. 2014. 119 f. Dissertação (Mestrado em Administração e Desenvolvimento Rural) – Programa de Pós-graduação em Administração e Desenvolvimento Rural, Universidade Federal Rural de Pernambuco, Recife, 2014.

FIRMINO, A. L. d. S.; CAMPOS, L. H. R. Perfil Socioeconômico do Corpo Discente da Interiorização das Universidades Federais do Nordeste**.** In: **A Interiorização Recente das Instituições Públicas e Gratuitas de Ensino Superior no Nordeste: Efeitos e Mudanças** – FUNDAJ, 2014.

MANFREDI, Silvia Maria. **Educação Profissional no Brasil**. São Paulo: Cortez, 2002.

MELO, P. B.; CAMPOS, L. H. R. **A Interiorização Recente das Instituições Públicas e Gratuitas de Ensino Superior no Nordeste: Efeitos e Mudanças –** FUNDAJ, 2014.

OTRANTO, Celia Regina. **Criação e Implementação dos Institutos Federais de Educação, Ciência e Tecnologia – IFETs.** In: Revista RETTA (PPGEA/UFRRJ), ano 1, p. 89-110, jan-jun 2010.

PACHECO, Eliezer (organizador). **Institutos Federais uma Revolução na Educação Profissional e Tecnológica.** Fundação Santillana. Editora Moderna, p. 6 – 14. Brasília, 2011.

SAMPAIO, Helena. **Evolução do ensino superior brasileiro:1808 – 1990.** Documento de Trabalho NUPES, 8/91. Núcleo de Pesquisa sobre Ensino Superior da Universidade de São Paulo, 1991.

_____. **O Ensino Superior Privado: tendências da última década**. Documento de trabalho NUPES/USP,6/89. Núcleo de Pesquisa sobre Ensino Superior da Universidade de São Paulo, 1989.

SCHWARTZMAN, S. **A Universidade Primeira do Brasil: entre Intelligentsia, Padrão Internacional e Inclusão Social**. Estudos Avançados (IEA-USP), v. 20, n. 56, 2006, p. 161-189.

UNZÉ, MARTÍN. **Transformaciones Recientes del Sistema de Educación Superior. Planificación Estatal y Autonomia Universitaria.** Instituto de Investigaciones Gino Germani. Universidad de Buenos Aires, 2012.

TAUFICK, A. L. O. L. **Avaliação da Política de Assistência Estudantil dos Institutos Federais para o Proeja.** Dissertação (Mestrado em Gestão e Avaliação da Educação Pública) – Programa de Pós-Graduação Profissional, Universidade Federal de Juiz de Fora, Juiz de Fora, 2013.